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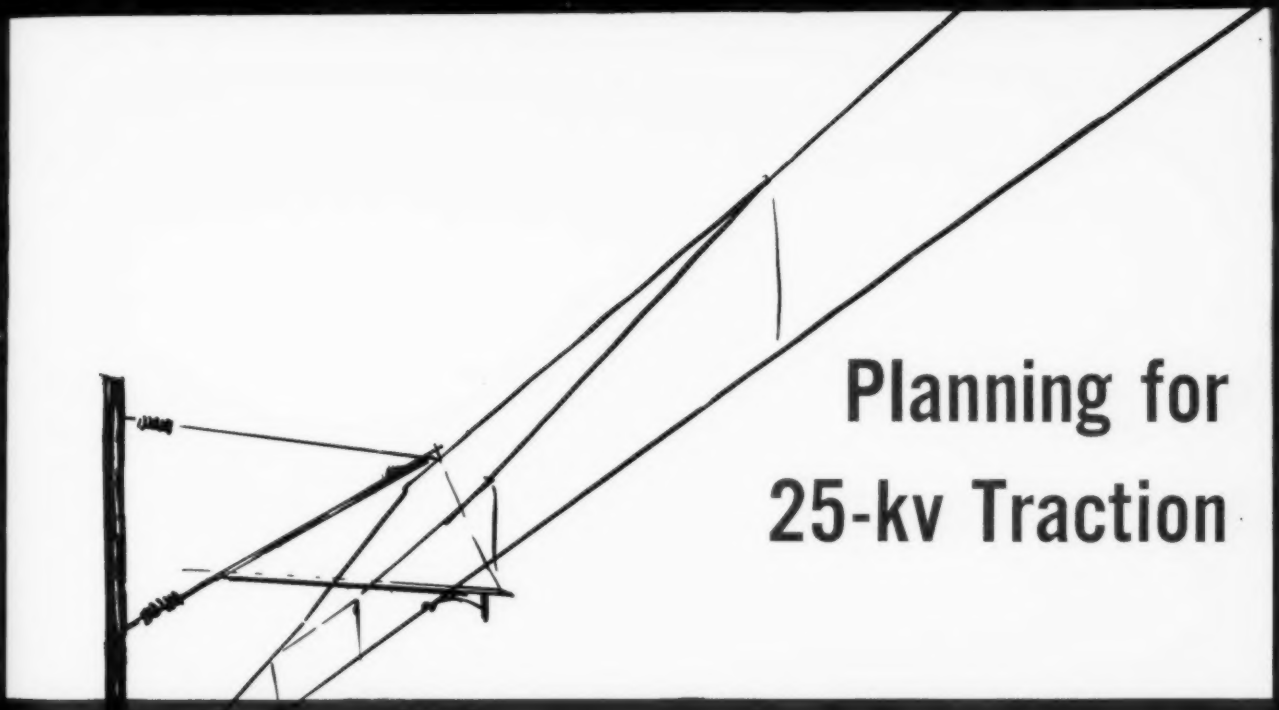
Neuheiten im Irischen Transportbetrieb
Nuevo Aspecto del Transporte Irlandés

INTERNATIONAL Railway Journal

April 1961



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Planung für 25 kV Betrieb

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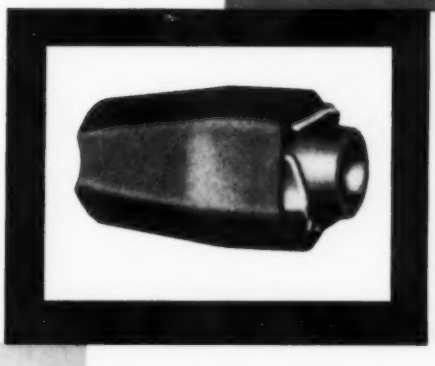

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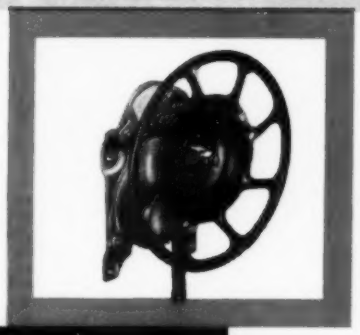

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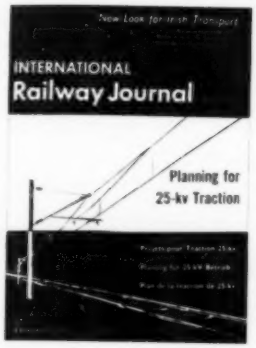

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Editorial Offices:
Lange Poten 29, The Hague, Netherlands
Postbox 305, Tel. 18 37 82,
Cable SIMMBOARD

Executive Offices:
30 Church St., New York 7, N.Y., U.S.A.

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RESUMEE

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RESUMEN

Nueva oportunidad ofrecida a los abastecedores ferroviarios para vender en el mercado internacional. Ahora cada anuncio puede llegar a 10,000 dirigentes ferroviarios en todo el mundo... y de un modo económico y eficiente, en *una sola* revista. International Railway Journal es leída prácticamente por todos los grupos ferroviarios de más de 50 países. IRJ es una revista internacional *autónoma* (no una edición extranjera de alguna revista norteamericana) que se publica en inglés con resúmenes en español (como éste), francés y alemán. Aproveche esta excepcional oportunidad para aumentar la distribución mundial de sus productos para ferrocarriles. Reserve espacio para su anuncio en 1961, pero hágalo sin demora.

World Market

▶ *African Explosives & Chemical Industries, Ltd.*—Have taken delivery of two Henschel DH500C diesel locomotives for use at the Modderfontein (Transvaal) nitrogen plant. The 410-hp units incorporate Voith Type L37V hydraulic transmissions.

▶ *Australia*—Under a recent agreement between Alco Products, Inc., USA, and Associated Electrical Industries, Ltd. (Great Britain), the Australian firm of A. E. Goodwin, Ltd., can now supply either AEI or General Electric (USA) generators, motors and electrical equipment in the Goodwin-Alco line of diesel-electric locomotives which it manufactures in Australia under Alco license.

▶ *British Railways (Eastern Region)*—In a comprehensive freight modernization plan for the Sheffield area, BR's Eastern Region will spend about £9,000,000 on a modern marshalling yard and diesel facilities at Tinsley, and on a freight concentration depot at Grimesthorpe. Work is expected to begin late this spring and to be completed by the end of 1964.

▶ *British Railways (North Eastern Region)*—Has ordered from Plasser Railway Machinery (G.B.), Ltd., two Plasser & Theurer HM 300 St spot tamping, lifting and leveling machines.

▶ *City of Seattle*—Linke-Hofmann-Busch GmbH, Salzgitter, West Germany, have reportedly obtained an order for two four-unit Alweg monorail trains, at a cost of about DM 2,000,000. The order, placed by Alwac International Corporation, of New York City, is for the city of Seattle, Washington state, USA, in connection with its 1962 "Century 21 Exposition" (IRJ, March, p. 7).

▶ *East African Railways & Harbours*—Have 63 freight cars on order from Dorman, Long (Africa), Ltd., of South Africa. Have ordered from Plasser Railway Machinery (G.B.), Ltd., one VKR-04 PX-10 leveling, lifting and tamping machine and one Plasser & Theurer VKR-03 super-hydraulic tamper. The freight cars will have Davis & Lloyd bogie components built by Scaw Metals, Ltd., Germiston, Transvaal, under arrangement with General Steel Castings Co., USA.

▶ *Egyptian Republic Railways*—Have ordered seven diesel locomotives from Czechoslovakian firms. Hitachi, Ltd., of Japan, is reported to be the low bidder on 100 rail cars for Egypt (IRJ, Jan., p. 11).

▶ *Italian State Railways*—Two 5000-ton ferry boats are under construction for service between Italy and Sardinia. Each of the stabilizer-equipped vessels will carry 76 motor vehicles.

▶ *New South Wales Government Railways (Australia)*—Have received from Commonwealth Engineering Co., Ltd., of Sydney, the first three of an order for five Budd RDC-type rail cars, built by Commonwealth as licensee of the Budd Company (USA). The cars follow the American Budd design, but are slightly smaller in size to fit the NSWGR loading gauge. Four of them are powered with two 300-hp Roots-blown General Motors 6–110 engines and Allison torque converter hydraulic drive; the fifth is not powered but contains

CONTINUED ON PAGE 55

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WORLD REPORT

Melbourne–Sydney Standard-Gauge Line Nears Completion

Completion of a 317-km standard-gauge (1.435-meter) line between Wodonga and Melbourne, to provide a through one-gauge route between Sydney and Melbourne, Australia's two largest cities, is scheduled for the end of this year.

There will be no intermediate stations, and both passenger and freight trains will carry interstate traffic exclusively. The line will be operated under centralized traffic control, and is being built for operating speeds of from 112 to 128 km/h.

It is expected that the first trains to use the line will be freight, with all rolling stock provided by the New South Wales Government Railways.

Passenger service, to be inaugurated several months later, will be operated jointly by the NSWG and the Victorian Railways. It will consist, at least initially, of the following trains:

Luxury 14-car night expresses, made up of new sleeping, dining and club cars now under construction;

Day expresses composed of existing NSWGR deluxe air-conditioned coaches; and

A night coach express made up of former broad-gauge (1.6-meter) VR cars fitted with standard-gauge Commonwealth bogies, and with air-conditioning equipment altered from axle-driven to head-end power. This train, which will make the 960-km trip in about 13 hours, will include a twinette sleeping car, a dining car and a baggage-power car. It will carry also a combined sitting-sleeping car to provide a connection between Melbourne and the national capital at Canberra. This car will be equipped with a small diesel generator to provide air-conditioning power between Goulbourn, NSW, and Canberra, when the car will be attached to a non-air-conditioned train.

Meantime, transfer to a new location of the Spencer Street Rail Motor Depot has completed a major step in the reconstruction of Melbourne's Spencer Street station for accommodation of standard-gauge trains. Work is also progressing on new standard-gauge locomotive facilities at Dynon to replace the former North Melbourne depot.

●

AUSTRALIA: New South Wales government approval for continued construction of the Eastern Suburbs Railway as far as Bondi Junction (8 km) is expected shortly. A large part of the tunneling in the downtown Sydney area has already been completed, but further work was deferred several years ago because of lack of funds. Recent increases in highway traffic indicate, however, the need for some form of off-the-road public transport. It is for that reason that government approval is expected—though some NSW legislators apparently favor construction of a freeway rather than a railway. The new line, with five of its eight stations underground, will be integrated with existing electrified suburban lines of the NSW Government Railways, which extend up to 56 km from the center of Sydney. NSWGR Commissioner N. McCusker has indicated that the new line may be unprofitable, but construction costs and part of its operating expenses may be met from other sources, because of the community benefit provided.

. . . Fate of the Queensland Railways' proposed electrification plans for the Brisbane suburban area will depend on investigations which Transport Minister G. Chalk is now conducting in Europe and the United States. The alternative to electrification would be greater use of diesel locomotives and rail cars. Brisbane suburban services, now predominantly steam-operated, carry about 27.5 million passengers annually. A total of 91 suburban cars now under construction have been designed for easy conversion to electric traction if and when necessary.

. . . Australian coastal shipping interests are introducing containers and container ships in a "rearguard" action to recapture some of the general cargo traffic which has been lost to railways because of faster and cheaper service and less pilferage.

CZECHOSLOVAKIA: Although only 136 km of new railway line have been built since the end of World War II, traffic is reported to have risen from 55,000,000 tons in 1946 to 180,500,000 tons in 1959. This has been handled by reducing car turnaround time from 7.5 to 3.88 days; hauling heavier freight trains at higher speeds, and faster loading and unloading. Planning up to 1965 contemplates a further increase in freight traffic, up to 254,000,000 tons. To handle it, Czech railways expect to electrify 1052 km of track, to bring total electrified mileage to 15 per cent of the system total; install more diesel locomotives; get more and heavier freight cars; and adopt more mechanical loading and unloading devices. Faster passenger service is also on the program.

. . . Information centers are reading, summarizing and coding, monthly, some 200 railway magazines from all over the world, plus about 400 magazines covering related fields. Books, studies and reports are included also.

COMMUNIST CHINA: Between May and December 1960, 110 special railway lines were built in more than 100 collieries, according to a recent Coal Ministry announcement. Tracks have reportedly been laid for an additional 100 similar short-distance lines to link collieries with trunk rail lines in areas where coal had previously to be transported by truck. (See page 60)

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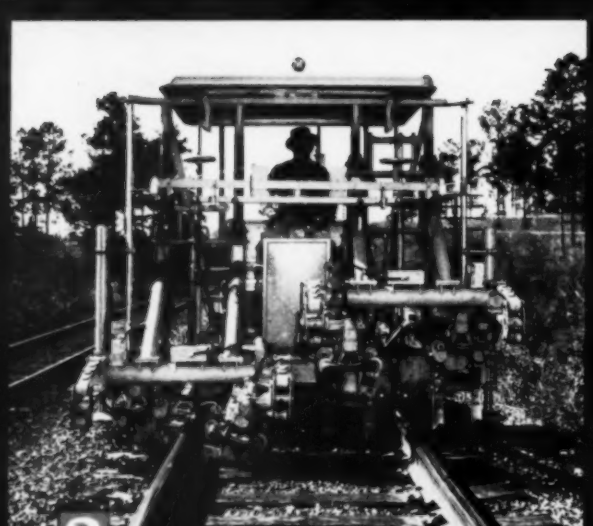

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Short Lines . . . . . .

Something Borrowed — To me one of the most encouraging trends in our railway industry is the increasing willingness of railway people to use each other's technical developments, either in modified form or as is. Netherlands Railways' interest in French piggyback equipment and purchase of German-designed hopper cars (p. 36) is a case in point, and is only one example of NS determination to use the best existing designs wherever suitable. With its SNCF electrics, DB auto-carriers, BR diesel shunters, and some thoroughly American electrics, NS is about as international-looking a railway as you can find. In countries that have not yet developed supply industries of their own this is to be expected, of course—when India adopts 25-kv electrification (p. 15) one looks for French technology as a matter of course. But the trend is no longer confined to railways in those countries; even the US is, at long last, beginning to look beyond its own borders for practical railway ideas. The US purchase of German diesel-hydraulics was one such case; the interest in an auto-carrier adapted from the familiar German design (p. 44) is another, and most encouraging, sign of a greater international awareness. Professional pride has always been a strong point of our industry, and it has produced a lot of good. But when it results in needless duplication of effort, producing dozens of different designs to do the same job, it can become a needlessly expensive luxury.

Something New — At the same time there is every need for fresh, imaginative thinking in all phases of the industry. Whether the result is a new approach to tunnel construction (p. 40), a freight car of novel construction (p. 44) or a new look in railway management (p. 24), the whole industry benefits. Particularly interesting to me is the growing tendency to recruit railway management personnel from "outside." Sometimes this produces a good deal of grumbling ("He doesn't know a thing about railways") and when a chemical-industry executive is chosen to head the British Transport Commission —as has just occurred—the grumbling gets louder. Personally, I think it's all to the good. We sometimes tend to think of our industry as being so unique that no "foreigner" could possibly understand it; one of the reasons is that we tend to think of a railway as a technology rather than as a business. We can stand, I think, a few more businessmen among the technologists.

Narrow Gauge in the Nth Degree — I am pleased to find that the Ravensglass and Eskdale Railway (gauge: 381 mm) finds IRJ of interest. Pleased, too, that "Ratty" has been saved from the scrappers and will run this summer. Our business is to serve railways, and there's none too small—or too narrow.

New Hand at the Throttle — In my first "Short Lines," written for our January issue, I stated rather strongly my conviction that IRJ should always remain in a sense a "prototype"—a constantly evolving and improving magazine rather than a machine-made production-line product. The job of publisher passes to Gordon Huffines with this issue and I am confident that this approach will continue. Mr. Huffines has spent virtually all of his professional career in railway and business journalism; his experience and knowledge of the industry assure an even better IRJ in the future.

David A. Beadle

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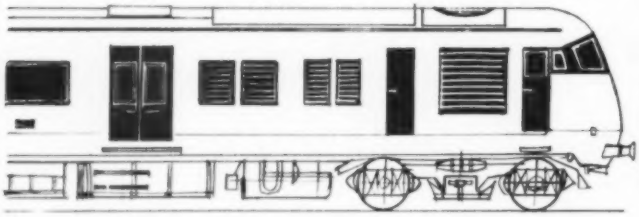

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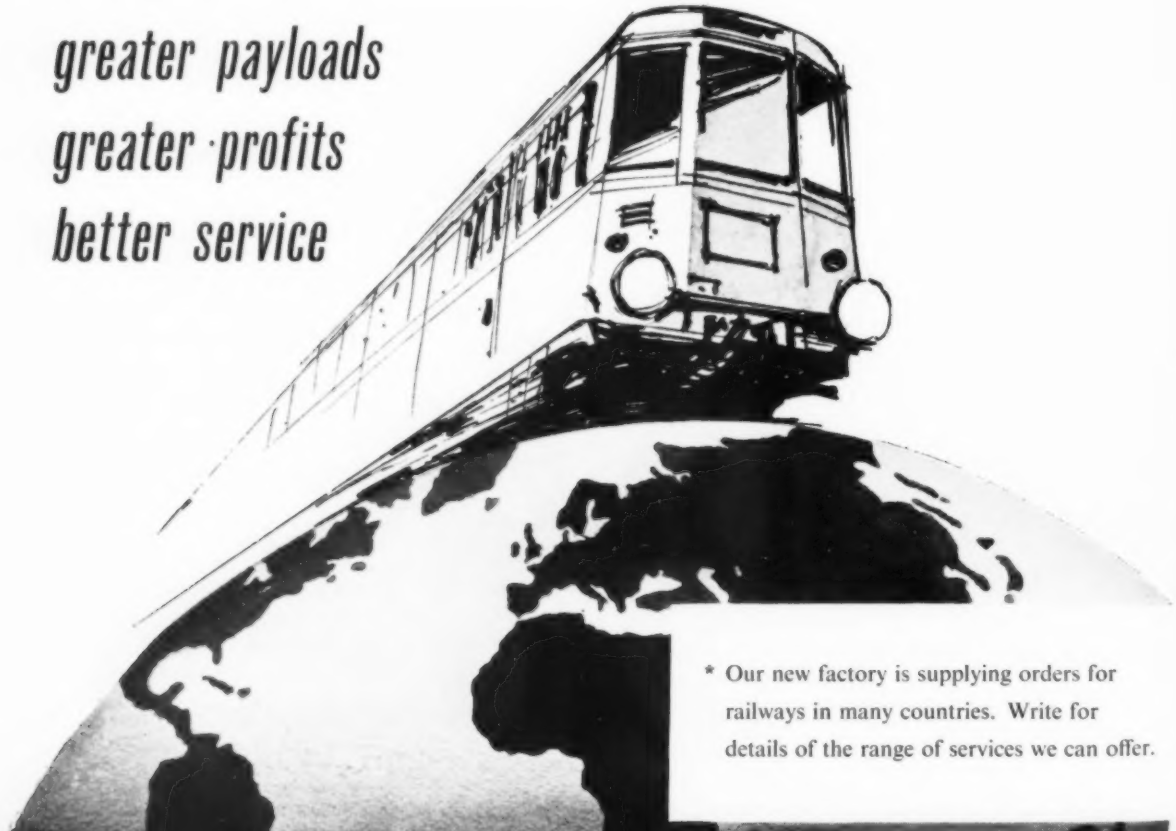

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International Railway Journal APRIL 1961

Planning for 25-kv Traction

By SRI A. NANDKEOLYAR
District Electrical Engineer (Survey),
Railway Electrification, India

Mr. Nandkeolyar entered railway services as an assistant electrical engineer in 1949, when he was studying in the United Kingdom. He joined the North Eastern Railway in 1950 and was transferred to railway electrification in 1958. He was selected for special training on AC traction with the SNCF in France, and is now working on the survey organization which he describes in the following paper. The paper originally appeared in the Indian bulletin, "Railway Electrification," and is reproduced with permission of that publication.

Because of the many problems involved in electrifying a section of railway, it is essential to set up a special survey organization to make a comprehensive advance study of both economic and technical features. The principal items to be dealt with would include:

- A technical and financial assessment to determine feasibility of electrification basic general designs, probable capital cost and financial return on net capital outlay.
- A comprehensive field survey of work to be done.
- Advance planning in regard to execution of the work and facilities required for maintenance of electrical installations and equipment.

Basic Considerations

Introduction of electric traction calls for heavy initial capital outlay, of which —in India—about 60 per cent is for electric locomotives. If, however, the overhead equipment and electric rolling stock can be intensively utilized, the savings in operating costs as compared to steam operation can be so substantial that electrification can be, financially, an attractive proposition. The important factors in determining this are, of course, the relative costs of coal and of electrical energy, and the intensity of traffic.

[On the basis of present costs of coal and electricity in India, the author says electrification of a double-track line having an annual traffic density of about 20 million ton-km per route-km will produce savings of about 5% of the net additional capital expenditure. On double-track suburban sections, an annual traffic density of 10 million ton-km per route-km may justify electrification as an alternative to extension of existing steam facilities. This would be particularly true where electrification would lead to increased train speeds and thus to increased track capacity.]

Traffic trend, and assessment of the services to be required at a future date, should be included as part of the basis on which electrification is planned. This will determine the operational characteristics of electric locomotives required to run the proposed services, taking into consideration permissible speeds, permissible loads—depending on allowable drawbar pull and capacities of sidings—and grades.

Electric power requirements will certainly be heavy, and it is therefore essential to ascertain the source from which such power can be obtained. If local electric supply agencies are unable to meet the necessary requirements, then generation of electricity will have to be considered along with the general plan for electrification.

Power requirements are computed on loading of trains and on grades. Spacing of substations for feeding power into the overhead equipment must be governed by permissible voltage drop during normal conditions and by emergency requirements which might be created by total failure of one substation. Single-phase power requirements for traction purposes may also lead to some adverse effects on

CONTINUED

Projets de Traction 25-kv

En raison des problèmes nombreux que comporte l'électrification d'une section ferroviaire, il est nécessaire d'établir une organisation (d'étude spéciale) pour effectuer une étude préliminaire des facteurs économiques et techniques, faire l'arpentage et préparer les plans. L'article ci-joint, basé sur un rapport de Sri A. Nandkeolyar, ingénieur électricien de district, électrification ferroviaire, esquisse comment une telle organisation fonctionne aux Indes.

Planung für 25-kV Betrieb

Die vielen Probleme, die mit der Elektrifizierung einer Eisenbahnstrecke verbunden sind fordern eine spezielle Organisation für ein umfassendes Vorstudium wirtschaftlicher und technischer Faktoren, der Terrainvermessung sowie für die Ausführung notwendiger Vorplanungen. Wie eine derartige Organisation in Indien vorgeht, wird in beiliegendem Artikel beschrieben, der einer Abhandlung von Sri A. Nandkeolyar, Distriktsingenieur für Eisenbahn-Elektrifizierung, entnommen wurde.

Planificar una Tracción de 25-kv

En consideración de los muchos problemas que surgen en la electrificación de una sección de la vía férrea, es esencial que se establezca una organización especial con el objeto de estudiar de antemano todos los factores económicos y técnicos, de ejecutar las operaciones de agrimensura y la planificación necesaria. En este artículo se encuantra una descripción del trabajo de una organización de esta índole, la que hemos tomado de un estudio del Sr. Sri A. Nandkeolyar, ingeniero en electrotecnia (agrimensura), electrificación ferroviaria.

Initial Planning Calls for Careful Field-Survey Methods

PLANNING FOR 25 KV CONTINUED

the three-phase main supply lines, so substations must be located so as to obtain satisfactory balancing of the load on the three phases. Local electric supply authorities should be consulted and advised of the traction power requirements at an early stage in the survey so they can keep the proposed location of traction substations in mind when planning their general electric supply grids.

Tunnels, bridges and other overhead structures on the tracks to be electrified may constitute formidable obstacles to erection of overhead equipment. They may need extensive modification at heavy cost to permit installation of wires at heights sufficient to permit normal train movements. The technical feasibility of carrying out these modifications, and their approximate cost, must be assessed. In extreme cases, this may be the determining factor concerning the feasibility of electrification.

It is good policy to restrict electric traction only to passenger trains and through freight trains running from junction to junction stations. This will obviate the necessity of installing overhead equipment on private sidings, where only occasional switching operations need to be carried out by locomotives of local freight trains. Also, there is no need to provide traction wires on sidings not used by through trains. Provision of overhead equipment on such sidings, where they will not be intensively used, is uneconomical.

Tracks to be equipped at station yards should be judiciously pruned down so far as possible. Turnouts and crossovers which are not used by through trains, either regularly or under emergency conditions, should not be wired, nor is it necessary to wire all sidings at small wayside stations. Wiring of sidings at alternate stations may meet the operational need for one electric train to be overtaken by another. Savings in capital cost achieved by such pruning may be substantial.

Decision regarding the tracks to be wired at various stations may necessitate long discussions with operating officers, who naturally want facilities for as much flexibility as possible in train running. Reduction in number of wired tracks at stations entails vigilance on the part of the station staff to see that incoming electric trains are not received on unwired tracks, while unwired crossovers reduce flexibility of yard operation.

After determining the tracks to be wired, it becomes possible to work out a sectioning arrangement to break up the overhead equipment into a number of elementary sections. Such arrangements should be designed to permit single-track operation over one block section of a double-track line if one of the main tracks is closed for any reason and isolation, for maintenance, of a small section of the overhead equipment in station yards without any serious dislocation in train operation.

While a majority of the sectionalizing switches may be manually operated, it is desirable to provide, at intervals of eight to 12 km, circuit breakers suitable for remote operation from a traction control center. These will permit quick isolation of overhead equipment over an eight to 12-km length of track in case a fault develops, and immediate restoration of electric supply to the non-faulty sections.

Programmed blocks for maintenance attention to the overhead equipment can conveniently take over a whole section between two consecutive control posts equipped with remote-operated switchgear. It is, therefore, desirable that the traction control center be located adjacent to the train control office, so the necessary program for daily maintenance blocks can be worked out by joint consultations.

It is also necessary to work out a general basis for modification of the signaling and telecommunications equipment to insure its safe, faultless and trouble-free operation.

Adverse effects of induction on mechanical signaling equipment can be easily tackled; introduction of insulated joints at regular intervals of, say, 300 m, is a satisfactory solution. Electrical interlocking, telecommunications and track circuits, however, present a more serious problem. All overhead wires running from station buildings to signal cabins, signals, etc., have to be replaced by cables. Other modifications, such as filters, relays, point detectors, etc., have to be worked out depending on type of signals, track circuits and other equipment being used.

Overhead equipment masts may adversely affect signal visibility, so general designs for relative location of signals and masts may also have to be worked out. Raising of semaphore signals or their replacement by color-light signals are possible solutions.

Possible adverse effects on telephone and telegraph wires may necessitate large-scale modification, or provision of booster transformers and return conductors to reduce induction effects. On the other hand, modification of main electric supply lines for general purposes is relatively simple, so long as enough clearance is available from the electrified tracks to facilitate maintenance.

The foregoing summary makes it clear that the following major items must be considered in estimating the capital cost of electrification:

• Civil engineering works, including:

1. Necessary modifications to bridges, tunnels, platform shelters, etc., to obtain satisfactory electrical clearance from the proposed overhead equipment.
2. Slewing of tracks in station yards to permit erection of supporting masts between tracks, where necessary.
3. Buildings for traction control center and for maintenance of electric rolling stock, overhead equipment, switchgear, etc.
4. Quarters for maintenance staff.

• Provision of overhead equipment, switchgear at supply control points and remote control equipment.

• Provision of required number of electric locomotives and/or electrical multiple-unit stock, and machinery for their maintenance.

• Modifications of existing electrical works, including general layout of main electric supply lines and arrangement of electric supply at new maintenance depots, switching stations and quarters.

• Modifications of signaling and telecommunications equipment required by introduction of AC electrification.

• General charges on account of tools and plant required for construction, and overhead charges on account of general administration.

While the foregoing items will give the gross capital expenditure required, it is necessary to take certain credits into consideration in assessing the financial advantages of electrification. Tools and plant used during construction may not have completed their useful life. Existing steam locomotives, and machinery and facilities for their maintenance, will become surplus after electrification. If expansion of steam operation to meet anticipated traffic requirements had been contemplated, the cost of additional steam locomotives, coaches and other required facilities may be taken as a credit to arrive at the figure of "net outlay" for comparison of capital costs of electric and steam traction.

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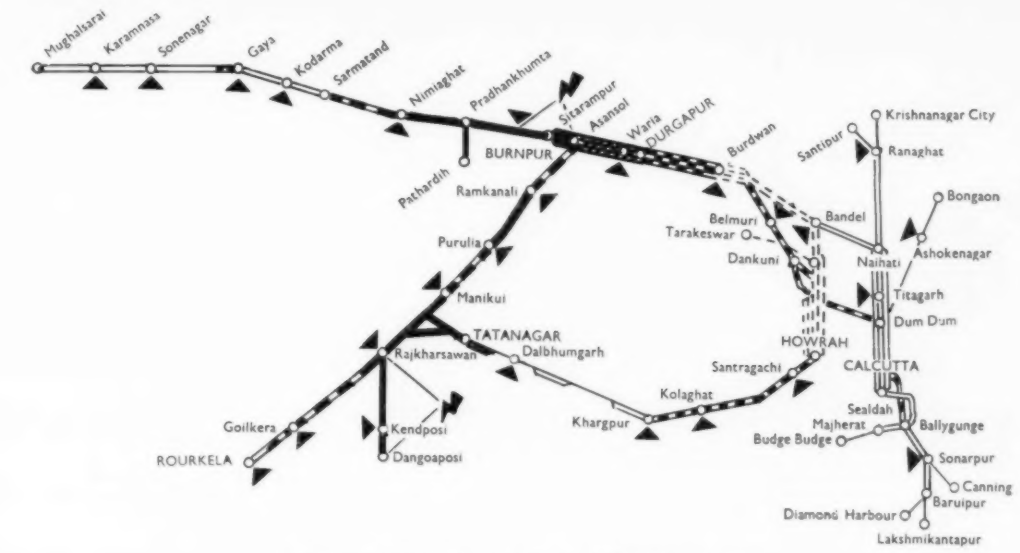


Railway Electrification as of October 1960

Current 25-kv AC electrification program, Second Plan

Existing 3000-volt DC lines, to be converted in future

Proposed 25-kv AC electrification under Third Plan

25-kv Substations

Overhead completed

Masts and foundations completed

Masts and foundations in progress

Overhead energized at 25 kv AC

Steel Plants TATANAGAR

Progress Report: India's Own AC Projects

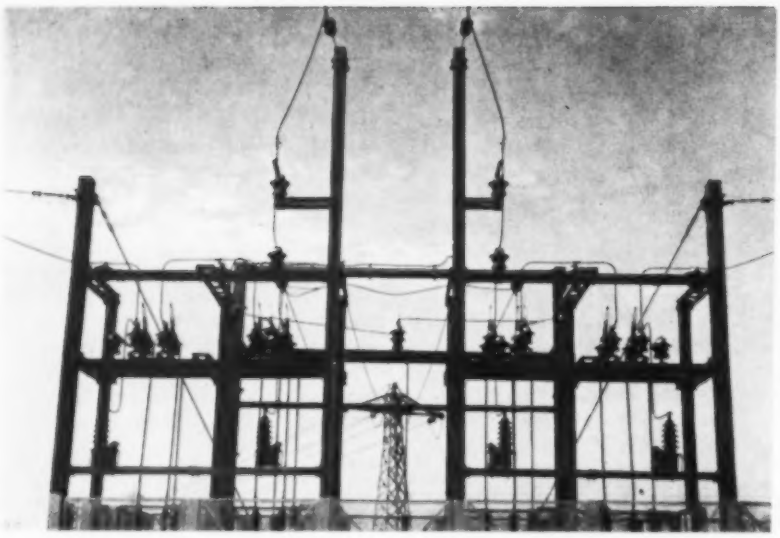
Indian railways are engaged in a major program of electrifying some 2,515 route-km of heavy-traffic lines with 25-kv single-phase AC at the commercial frequency of 50 cycles. The lines being electrified include those serving the West Bengal and Bihar coal fields, and new steel plants in the same general area. The 3000-volt DC Calcutta-Burdwan electrification, 141 km, will be converted to AC.

India has adopted the AC system because experience in other countries —especially France—has demonstrated that important reductions in initial cost and improved operating characteristics can be obtained from rectifier locomotives using commercial AC current with DC traction motors.

One major saving is in the cost of overhead equipment. Steel per track-km in the AC system runs from one-half to one-third of that needed for DC. With an amperage reduction from about 1100 maximum for DC to about 600 for AC, copper requirements are approximately halved, and weight of overhead equipment is reduced from 3.8 to 1.6 kg/m.

The initial electrification will be handled by 110 freight-passenger locomotives, 100 from a consortium of European builders and 10 from Mitsubishi of Japan. Another 42 heavy-duty freight locomotives are to be ordered. All are ignitron-rectifier units, with DC traction motors and Bo-Bo wheel arrangement. Multiple-unit car sets will be purchased when electrification out of Calcutta's Sealdah station is done.

The electrification is administered by a separate organization headed by a general manager, H. D. Awasty. He reports to the Railway Board much as do the general managers of the eight railways that constitute the Indian system. The organization, with 104 officers and nearly 600 technicians and supervisors, has enough autonomy to achieve maximum flexibility and efficiency in progressing its work on the separate railway lines involved.



PLANNING FOR 25 KV CONTINUED

Annual working expenses on account of coal and electricity charges, repairs, maintenance and depreciation for rolling stock under steam and electric traction are computed for operation of the proposed services on the basis of which electrification is planned. The difference between these gives the annual saving resulting from replacement of steam by electric traction. With sufficient traffic density, this annual saving may, as mentioned earlier, be five per cent or more of the net outlay.

Field Survey

The field survey consists essentially of collecting accurate data at the site. In normal railway operation, some work on tracks and signaling is usually programmed or in progress at various stations. If designs for these programmed works can be so modified that they will meet the requirements of AC traction, some duplicating work and expenditure can be avoided. The field survey may, therefore, be divided into two parts: collection of plans showing work on program or in progress and collection of plans showing existing layouts, arrangements and facilities, and checking them at the site. Collection of plans for work not yet executed should be given priority; they should be expeditiously studied and necessary modifications worked out for incorporation before work is completed.

In addition to collection of plans, the field survey of existing layout, arrangements and facilities should include surveys of the track, of signaling and telecommunications installations, and of existing main electrical supply lines.

An accurate meter-by-meter survey of tracks from one end to the other of the section to be electrified will permit preparation of the prepegging plans—preliminary plans showing proposed location of overhead equipment masts, to be finalized after the site check. Certain rules have been laid down for location of these masts for AC overhead equipment, and these rules have to be rigidly followed. Their main features are:

- A structure must be located close to the theoretical center of turnouts and crossovers.
- Maximum span on curves is determined by degree of curvature.
- Difference between adjacent spans should be limited to 18 m if electric trains are to be run at more than 100 km/h.

To permit preparation of prepegging plans for an economical design of overhead equipment layout, the finalized track survey plans should be prepared to a scale of 1:500, showing each rail separately. The plans should indicate:

- Exact location of all turnouts, crossovers, platforms, station buildings, overhead bridges, water columns, signal cabins, signals, signal rod and wire runs, level crossings, culverts and bridges, etc.
- Location of curves, their degree and superelevation on rails.
- Track-center distances at regular intervals.
- Cross-section of embankments at regular intervals.
- Any other item, above or below ground, which may present an obstacle to erection of masts and their foundations.

The purpose of the signaling and telecommunications survey is to collect all necessary data for working out modifications needed to insure safe operation after introduction of AC traction. The major items here are:

- Location of signals, their heights and clearances available from electrified tracks.
- Method of operating signals and types of arms and light repeaters.
- Working arrangements for signals.
- Location and length of point rodding and wire runs.
- Length, type and arrangement of track circuits.
- Location and types of signaling and three-position relays, point detectors, key transmitter, point machines, circuit breakers and track indicators.
- Details of train control system and telegraph circuits.
- Location and types of block instruments.

The survey of electrical overhead lines consists mainly of checking clearances from electrified tracks. It is essential to check both vertical and horizontal clearances to insure that there will be no interference with normal maintenance work and that induced voltages in wires do not reach dangerous values.

Advance Planning

The major item of work in connection with introduction of electric traction is provision of overhead equipment. This work has to be done on the tracks in a section where traffic density is growing and traffic stoppage is hard to obtain. It is therefore essential that execution of the work be planned in detail. All materials should be available well in advance to reduce to a minimum the number of operations to be carried out under traffic stoppages.

The work of the survey organization in this connection consists only of advanced planning for such things as location and size of stores depots; location, number and length of sidings for work trains; and, in consultation with the operating department concerning traffic blocks which will be available for the work. Arrangements have also to be made for necessary equipment for the work trains, and for special equipment for the stringing of wires.

The additional assets created by electrification must be regularly maintained, and it is essential to plan in advance for the necessary maintenance facilities. Usually it is advisable to locate the electric locomotive shed at a point where steam locomotive sheds already exist, because operating personnel are already based there. Sheds for multiple-unit stock should be located at stations where the largest amount of such equipment is kept

CONTINUED ON PAGE 56

Refrigerator cars and trucks, and insulated trailers, handle fruit safely over long distances from farms to ports.
Wagons et camions réfrigérants et remorques isothermes transportent les fruits sans dégâts des fermes aux ports lointains.
Kühlwaggons und LKW sowie Wärmeschutzwagen bringen das Obst im Fernverkehr wohlbehalten von den Plantagen zum Hafen.
Vagones y camiones frigoríficos y remolques isotérmicos transportan la fruta por largas distancias de los ranchos a los puertos.

How SAR Handles Perishables

Comment SAR Transporte les Fruits

Les chemins de fer de l'Afrique du Sud stimulent l'exportation en fournissant le transport entre les champs et les marchés. Wagons et camions réfrigérants, transport rapide par route et rail, dépôts de préréfrigération aux ports principaux, tout coopère pour vaincre les facteurs temps et distances énormes.

Wie SAR Obst Transportiert

Die Südafrikanische Eisenbahn unterstützt den inländischen Obst-Export; ihr Transportsystem kürzt Zeit und Entfernung zwischen Plantage und Markt. Waggons und Lastwagen mit Kühlvorrichtungen eilen über Auto- und Schienenwege, Kühlhäuser in den Häfen sind aufnahmebereit—es ist ein erfolgreiches System.

Cómo los SAR Transportan Fruta

Los ferrocarriles del Africa del Sur adelantan a la industria exportadora de fruta de su país proporcionándole medios de transporte que superan la distancia entre los campos y los mercados. Vagones refrigeradores, transporte rápido y almacenes de refrigeración previa en los principales puertos, he aquí los factores que aseguran el éxito de las operaciones.

Some 10,000 kilometers separate the orchards of South Africa from European and American markets. It may be three weeks or more after picking before the fruit is eaten. It follows that the whole fruit export structure is ruled by factors of time and distance, which can be overcome only by transport that preserves quality and appearance. Such transport has, today, become a commonplace achievement.

South Africa's railways have made a positive contribution to the growth of their country's deciduous and citrus fruit industries, by providing transportation which makes it possible for such fruit to reach London or Stockholm—or other distant consuming centers—in tasty, appetizing, attractive condition.

South Africa's first fruit orchard was

CONTINUED ON PAGE 54

Pre-cooling chambers at Cape Town store 7700 tons of fruit; handle 13,000 tons per week.
Chambres de pré-réfrigération au Cap emmagasinent 7700 t de fruit; 13.000 t/semaine.
Kühlhäuser in Kapstadt mit einer Leistung von 7700 t Obst; Umsatz 13.000 t pro Woche.
Enfriaderos en Ciudad del Cabo almacenan 7700 toneladas de fruta, 13.000 semanales.

WORLD POLL

How Railways Use Radio — Part I

Use of radio communication in the railway industry is growing. It is, and will be increasingly, employed in control of shunting operations and in maintenance, perhaps the two most prominent uses to which railway radio is now being put. Four railways replying to IRJ's "World Poll" survey rely on radio almost exclusively for communication, and others plan to switch to it. Radio also will be installed more and more extensively for train-to-wayside communication and for end-to-end communication on long trains. And radio, in its various forms, will, to an expanding extent, replace wire and cable circuits as a basic communications medium.

L'utilisation de la communication par radio s'amplifie dans l'industrie ferroviaire. On l'emploit de plus en plus pour les manoeuvres et l'entretien, les travaux les plus importants de l'utilisation de la radio aux chemins de fer. En réponse à "l'Enquête Mondiale" de l'IRJ quatre sociétés de chemin de fer disent qu'elles se servent presqu'exclusivement de la radio pour les communications et d'autres l'adapteront. On se servira de plus en plus de la radio pour les communications trains-stations et d'un bout d'un long train à l'autre. La radio, dans ses formes différentes, remplacera dans un avenir prochain les systèmes de fils et de cables comme moyen de communication.

Funkspruch wird im Eisenbahnbetrieb immer häufiger angetroffen. Er ist und wird weiter eingeführt; seine Verwendung bei der Kontrolle des Rangierbetriebes und bei der Wartung ist vielleicht am auffallendsten. Vier Eisenbahnverwaltungen haben der IRJ's "World Poll" Übersicht mitgeteilt, dass sie sich für Meldungen fast ausschliesslich auf Funkspruch verlassen; andere haben die Absicht, sich darauf umzustellen. Stets mehr und weitgehend werden für Zug-Strecke- sowie für End-zu-End-Meldungen in langen Zügen, Radioanlagen in Betrieb genommen. Radio in verschiedenen Formen wird in immer grösserem Umfang als normales Nachrichtenelement Draht- und Kabelleitungen ersetzen.

El empleo de la comunicación radiofónica en la industria ferroviaria viene aumentándose. Será aplicada más y más en las operaciones de maniobra y en la conservación, siendo éstas actualmente las aplicaciones más conspicuas. Cuatro ferrocarriles que han contestado a la encuesta mundial de la IRJ, cuentan casi exclusivamente con radio para sus comunicaciones y otros más tienen el próposito de adoptarla. Se instalará la radio también en cada vez mayor proporción para la comunicación con los trenes y en los trenes mismos. La radio en sus diversas formas reemplazará más y más los circuitos de alambres y cables como medios de comunicación básicos.

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• **SNCF—Algeria:** Radio communication serves as an emergency facility in cases of civil disturbance or malfunctions of telephone circuits; both very high frequency (VHF) and single-sideband systems are used. No extension of the present installation is envisaged, as it is regarded as sufficient for the system's needs.

• **Austrian Federal Railways:** Radio is used in classification yards—eight yards are equipped, with two more to be equipped in 1961—and for a variety of inspection and maintenance operations. Equipment is by Telefunken; the "Teleport V" is used most extensively, though there are a few installations of other types. The system has 11 central radio installations; 19 locomotives and two lake steamers have radio equipment, and 87 portable sets are in service. "More extensive use of radio is planned, but depends on allocation of the necessary funds."

• **Belgian National Railways:** Uses radio for classification yard operation, pickup and delivery by road vehicles, and maintenance of overhead and track, but not for line dispatching. Both AM and FM sets are used, in every case employing simplex transmission on a single frequency. Ten yards are radio-equipped, as are 43 motive-power units and 104 road vehicles. There are 21 central stations and 70 portable sets. Plans to extend radio use: "Every marshalling yard must be equipped with radio communication (fixed, mobile and portable sets). Each big center for pickup and delivery with road vehicles is to be equipped in the near future. There are a lot of applications for lightweight portable sets in operating and maintenance."

• **Bern-Lötschberg-Simplon:** Uses radio for communication in construction work, in inspection of safety installations, and—experimentally—for communication between head and tail ends of trains, from trains to stations, and in shunting. Telefunken "Teleport" equipment is used, and line has six portable sets. "No substantial development planned for the time being. Studies have not been completed yet."

• **EF de Bragança (Brazil):** Does not use radio. Has no plans for its future use.

• **British Railways:** Uses radio in classification yard operation, parcel delivery service, on wrecking trains, in plant security and in locomotive-works shunting tractor operation. Single-frequency simplex AM or FM is used for classification yards and engineering services; two-frequency AM for parcel delivery, plant security, and locomotive-works shunting. Seven central installations are used in parcels service and 20 in 14 classification yards; 67 portable sets are used in shunting locomotives; 46 road vehicles have radio, and 13 portable emergency sets are in use. Extension of radio use is planned: "Not possible to give details but it is possible that radio for marshalling yards and parcel delivery and collection services will be extended. Other applications have been and are being studied but no definite information is available at present."

• **Canadian National Railways:** Radio is used in car inspection; end-to-end and train-to-station communication; shunting; hump-yard construction and operation; maintenance gangs. Narrow-band (30 kc) FM mobile equipment is used on frequencies from 159.810 to 161.535 mc. Dispatcher-to-train radio communication is in use on 1640 km of line out of the system's total of 40,235, and 24 classification yards are radio-equipped. Central stations number 84; there are 540 sets in motive power, 247 in rolling stock, 58 in road vehicles, and 185 portable sets. "End-to-end radio is to be extended over entire main line trackage. Additional point-to-train and yard communications will be provided wherever needed."

• **Canadian Pacific Railway:** End-to-end train communication; train to yard or dispatcher in certain areas; shunting; control of road express vehicles; police communications. FM transmission is employed, and 11 yards are radio-equipped. CPR has 32 central installations, 214 in motive power, 143 in rolling stock, 33 in road vehicles and 64 portable sets. Plans "extension of existing types of facilities in areas already served and introduction of these services to selected new areas."

• **CF Franco-Ethiopien de Djibouti a Addis-Abeba:** Does not use radio.

• **Commonwealth Railways (Australia):** Uses radio for dispatching on 1850 km of line between Port Pirie Junction, South Australia, and Kalgoorlie, Western Australia, in the form of high-frequency AM radio between stations. Also uses VHF FM radio for end-to-end train communication. Has three central installations, 29 in motive power and 12 in brake vans. Two classification yards are equipped. Plans to extend radio use for omnibus service with selective calling between stations approximately 320 km apart, using high-frequency AM, and installation of FM equipment in an additional 14 locomotives and 12 brake vans.

• **Coras Iompair Eireann (Ireland):** Has one central installation and six mobile sets for control of Dublin-area parcels delivery and collection; VHF on 87.05 mc (base station) and 77.05 mc (vehicles). No definite plans for extension.

• **Danish State Railways:** Fully automatic radio-telephone is in use for ship and ferry-boat communication (26 installations) and for maintenance. In addition to ferry-boats, system has six central installations and six in road vehicles. "Within the next few years we intend to apply a number of radio installations to shunting service."

• **Deutsche Eisenbahn-Gesellschaft:** None of the 22 railways operated employs radio.

• **East African Railways & Harbours:** Uses radio chiefly for point-to-point communication and marine operations (port and inland navigation), but has one classification yard experimentally equipped, with sets in five locomotives. Central stations number 28, sets in road vehicles, six, and port and inland marine installations, 38. Plans extension, but "only comparatively small and slow development is anticipated and no major schemes are planned at present."

• **Finnish State Railways:** Uses radio for yard operations, and track construction and electrical installation crews. Uses semi-duplex transmission for hump operation, and semi-duplex connected to the telephone system for track construction; otherwise simplex. Six central installations, eight sets in locomotives, one in a road vehicle, and 18 portable sets are in use. Four classification yards have radio installations. "Orders are placed to extend all services mentioned above. The first line radio system will be installed on a line of 154 km, with several links and base stations. The system will employ about 100 two-way radio units (fixed and mobile)."

• **German Federal Railways:** Uses radio for shunting operations, inspection and testing, police communications, ship operations, control of transport units in freight terminals and shops, and in maintenance; also, for public telephone service from certain express trains. Uses FM with a 50-kc band width; sets have a power of from 1.6 to 10 watts, nine channels. Central installations number 550; approximately 1400 sets in locomotives, 30 in rolling stock, 20 in road vehicles, and 1600 portable sets. Radio-dispatching installation now under construction will cover 100 km of line. Some 200 classification and passenger yards are radio equipped. No present plans to increase or extend radio communication.

• **Ghana Railway and Harbours:** Will shortly put VHF portable radio telephone equipment into service for engineering work parties; at present has only two portable sets.

• **EF Goiás (Brazil):** Uses radio-telegraph and radio-telephone for point-to-point communication between terminals, federal capital in Brasilia, and federal railway system headquarters in Rio de Janeiro. Frequencies 8890 and 11,465 kc. No plans for extension of service.

• **Hellenic State Railways:** Does not yet use radio.

• **International Railways of Central America (Guatemala):** No radio in use; none planned.

• **Iraqui Republican Railways:** Radio not used.

• **Italian State Railways:** Uses UHF simplex radio for limited shunting service (eight locomotives equipped, three central installations) and for construction and maintenance crew protection. About 100 portable sets in use. Plans extension of radio both for maintenance and for classification-yard operation.

• **Jamaica Railway Corporation:** Does not use radio.

Next month's "World Poll" will continue its review of the individual replies given by the 60 answering railways, and discuss the results.

Britain: 'Trans-Pennine' Diesel Sets

To provide improved inter-city services between Hull, Leeds, Manchester and Liverpool, the North Eastern Region of British Railways has introduced new six-car diesel trains. With a power-weight ratio of 8.1 hp per ton, the underfloor-engined sets have cut previous schedules by as much as 45 minutes, despite a number of exacting grades.

Rames Diesel 'Trans-Pennine'

Des nouvelles rames diesel de six voitures, et à moteurs sous le plancher, ont permis aux British Railways de réduire de 45 minutes les horaires précédents entre Hull, Leeds, Manchester et Liverpool.

'Trans-Pennine'-Dieselzüge

Neue Diesel-Sechswagenzüge, mit Motoren unter dem Fussboden, ermöglichen der British Railways, die früheren Fahrzeiten zwischen Hull, Leeds, Manchester und Liverpool mit 45 Minuten zu kürzen.

Ramas Diesel 'Trans-Pennine'

Nuevas ramas diesel, cada una de seis coches, de la North Eastern Region de los British Railways permiten una reducción de 45 minutos en los trayectos entre Hull, Leeds, Manchester y Liverpool.

Called "Trans-Pennine," the new diesel trains have been built at the Western Region's Swindon Works—34 powered cars and 17 trailer cars in all, to permit improved and more frequent service. Each six-car train consists of four powered cars, with two intermediate trailers, as follows:

Car 1—Motor brake composite, with cab, 21-seat first-class section and 36-seat second-class section.

Car 2—Motor brake second, with 48 second-class seats in six eight-seat compartments, and guard's and baggage compartments.

Car 3—Trailer first buffet, with 18 first-class seats in three compartments, and buffet with grill and bar.

Car 4—Trailer open second, with 64 second-class seats.

Car 5—Motor brake second; same as Car 2.

Car 6—Motor brake composite; same as Car 1.

All cars are 19.6 meters long and 2.7 meters wide at the waist. They have been designed on the stressed body principle—with underframe, sides and roof combining to form a welded structure. This leaves the underframe free from conventional trussing, providing space below the floor for suspension of diesel engines and auxiliary equipment.

The front of the driver's cab is formed from a single fiberglass molding which provides wraparound windscreens. Windows in the first-class sections and the principal windows in the buffet car are double glazed. Doors are cast aluminum.

The 2.5-meter wheelbase bogies are of riveted construction, using rolled steel sections and fabricated sub-assemblies. The Timken roller-bearing axle boxes are provided with manganese steel liners. Special attention has been given to the alignment of the horn guides, which also have renewable manganese liners.

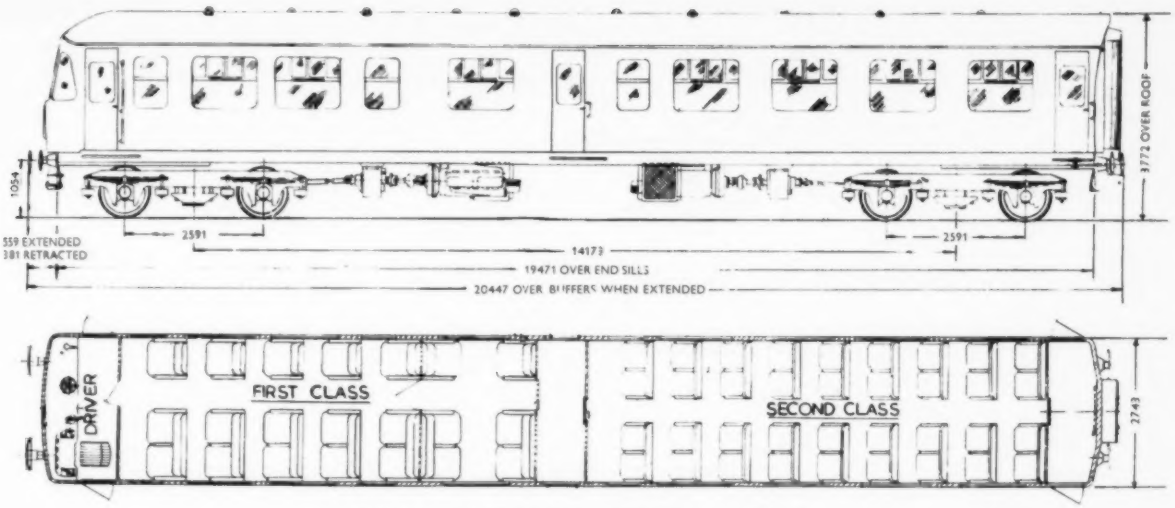
Two Leyland/Albion 6-cylinder horizontal diesel engines are mounted below the floor of each powered car, together with transmission and auxiliary equipment. Each engine has a maximum output of 230 bhp at 1900 rpm and is fitted with 55-cm fluid flywheels. A short cardan shaft and free wheel connect the engine to a four-speed Wilson gear box; a further cardan shaft connects the latter to the forward and reverse final drive mounted on the inner axle of the bogie. Throttle, gear box and final drives are electro-pneumatically operated.

Control equipment permits up to six powered cars to be operated from any one driving cab. Electrical control circuits are carried between cars by four 19-point flexible jumper couplings. All power equipment has been supplied by British United Traction, Ltd.

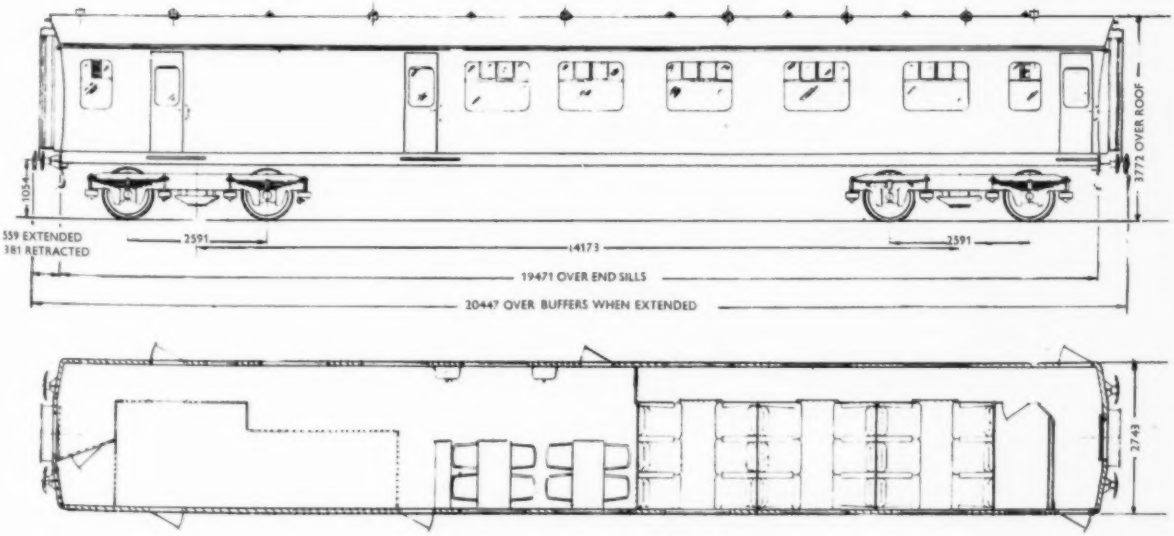
The interior decoration makes considerable use of laminated plastics. Floors are linoleum covered; seats are upholstered in moquette, and lighting is fluorescent. All baggage racks and other fittings are of anodized aluminum. Cars are heated by warmed air provided by Smiths combustion air heaters (two per car) mounted under the floor. In warm weather, all heaters can be switched off and filtered air, at ambient temperature, circulated through the vehicles.

Open trailer car seats 64 passengers in second class.
Remorque sans compartiments à 64 places en seconde.
Unabgeteilter Wagen, zweite Klasse, für 64 Personen.
Coches pueden transportar 64 pasajeros en la clase 2.

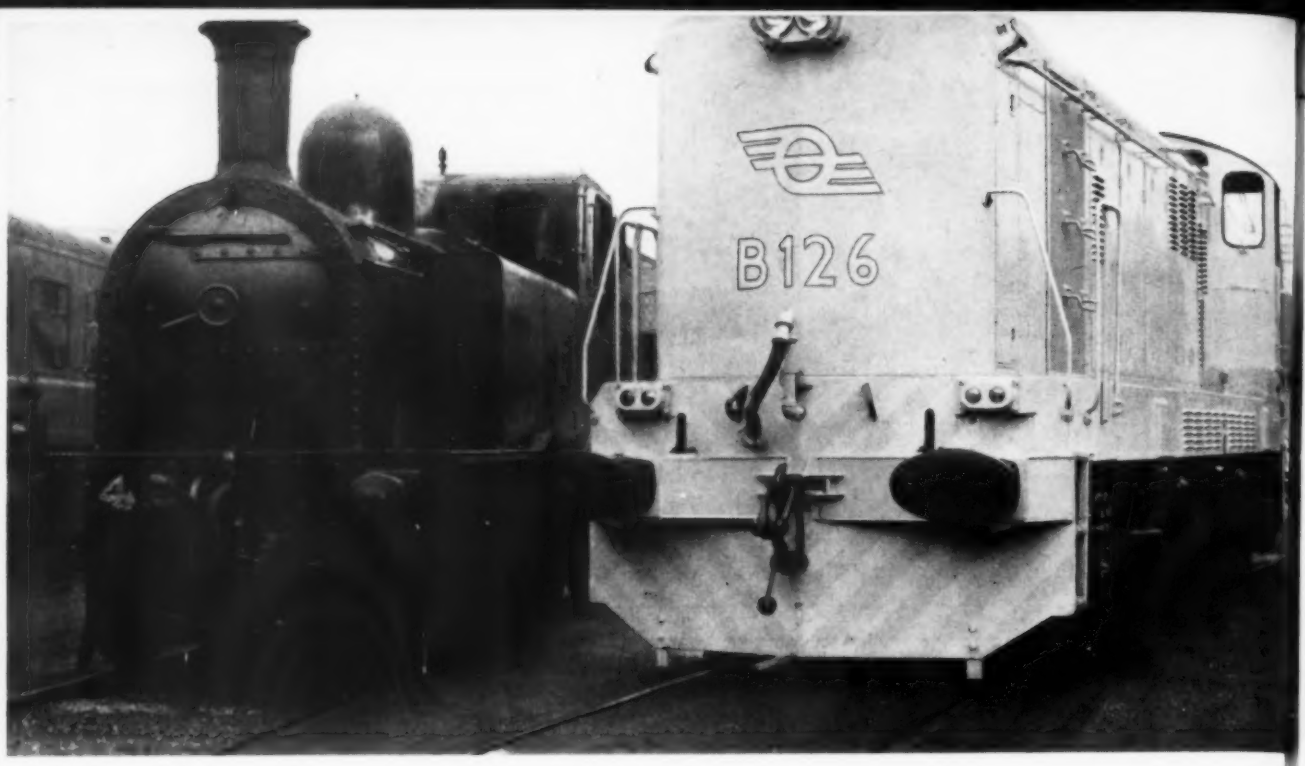
When buffet is open panel in front of bar drops down.
Buffet ouvert en rabattant le panneau devant le bar.
Für Buffetbetrieb wird Vorderwand der Bar heruntergelassen.
Basta bajar un tabique y el bar está abierto.



Motor Brake Composite



Trailer First Buffet



New Look for Irish Transport

Renovation du Transport Irlandais

Par l'application d'idées et de techniques nouvelles la Coras Iompair Eireann—la société de transport irlandaise—passe par ce que l'on pourrait désigner par "une phase transitoire excitante."

Outre la réorganisation administrative, le programme CIE prévoit l'élimination de lignes et gares non-économiques; amélioration des services voyageurs; stimulation pour attirer le trafic marchandises, accompagnée d'une campagne parallèle de maniement convenable du fret; modernisation de l'outillage.

Derrière ces changements plutôt violents se trouve la volonté d'une nouvelle direction de voir la compagnie réaliser des bénéfices vers 1964. Le but de la nouvelle direction décentralisée de CIE est d'arriver à un système "non uniquement rail, non seulement route, mais un réseau intégral de transport."

Neue Aussichten für den Irischen Transport

Auswertung neuer Ideen und Techniken werden zur Zeit von der Coras Iompair Eireann—der Irischen Transportgesellschaft—durchgeführt; eigentlich muss dies als "anregende Übergangsphase" bezeichnet werden.

Ausser einer Reorganisation der Betriebsführung enthält das CIE-Programm: Beseitigung unwirtschaftlicher Strecken und Stationen, Verbesserung der Reiseverhältnisse, eindrucksvollere Werbung und Förderung des Güterverkehrs; parallel dazu Massnahmen für die Gewähr einer richtigen Güterabfertigung; Erweiterung technischer Anlagen und Anschaffung neuer Antriebe, vorwiegend Dieselantriebe.

Zweck der neuen dezentralisierten Betriebsführung ist die Schaffung eines Systems, das 1964 „nicht nur Schiene, nicht nur Weg, sondern ein leistungsfähiges Transportsystem" sein wird.

Nuevas Vistas para el Transporte Irlandés

Aplicando nuevas ideas y técnicas, el Coras Iompair Eirlann (Compañía de transporte irlandés) experimenta actualmente un "emocionante período de transición."

Aparte de una reorganización administrativa el programa de la CIE engloba la eliminación de líneas y estaciones antieconómicas; la mejora del tráfico de pasajeros; una propaganda más agresiva y la estimación del tráfico de mercancías fomentando al mismo tiempo la manutención correcta; la mejora de las instalaciones fijas; nueva fuerza motriz, en primer lugar locomotoras diesel.

Un nuevo grupo de directores se empañará en sentar las bases de una explotación gananciosa en el año 1964.

El objeto de la gerencia decentralizada es un sistema, no meramente ferrocarril, sino una red de transporte que forma un todo.

Deadline for Profits: 1964

Ireland is on the perimeter of Europe; it has one of the smallest populations and one of the smallest population densities of any European country. Primarily agricultural, its economy boasts no heavy industry and little industrial activity of any kind. Per-capita income is among the lowest in Western Europe, and only two cities have populations of more than 100,000.

Providing public transport for such a country is neither an easy nor an enviable job, but it is the job with which Coras Iompair Eireann—the Irish Transport Company—has been entrusted. Because population is thinly distributed, CIE's more than 3000 km of track has the greatest kilometrage per person in Europe, with the exception of the Norwegian and Swedish railway systems; the international traffic in passengers and freight experienced by most other European railway systems barely touches CIE.

Nor has CIE's task been a profitable one, especially with regard to railways; for its road and rail services CIE as a whole showed an operating loss every year from 1950 to 1956, except for a small profit in 1955; after allowance for financial charges, net losses required a total of £12.01 million between 1949 and 1956. A large part of the loss, moreover, was attributable to CIE's rail operations, for road services were generally profitable.

Today a thoroughly-overhauled CIE has been given a deadline by which to begin earning its keep, and with the help of a streamlined management, physical modernization, and an aggressive approach to the sale of its services there is every indication the 1964 deadline will be met.

When CIE's new board was appointed in 1958, under the chairmanship of Dr. S. C. Andrews, it had several weapons with which to fight the battle for profitable working. There was also a time limit in which to eliminate deficit working. No time has been lost in applying new ideas and techniques and at present the Irish system is undergoing what can only be described as an exciting transitional phase which its executives believe will enable them to get "in the black" by 1964.

To trace the need for these comparatively violent changes it is necessary to go back to 1944 when the Transport Act resulted in the merger of the Great Southern Railway Company and the Dublin United Transport Company. The new company was Coras Iompair Eireann with an initial capital of roughly £13.4 million. The railway system which the new organization inherited was largely out of date and generally in a state of disrepair—for example, the 405 steam locomotives had an average age of 51 years.

As the main authority for the provision of public transport in the Irish Republic, CIE operates both road and rail passenger and freight services. In general the road services have been profitable and the rail services unprofitable. As a whole CIE showed an operating loss from 1950 to 1956, except for 1955 when there was a profit of £44,062. Losses after providing for interest, sinking fund and pension fund were £2.09 million in 1952, £2.01 million in 1953, £1.02 million in 1954, £866,535 in 1955 and £1.62 million in 1956. From 1949 to 1956 direct state aid totaled £12.01 million.

To rehabilitate the system a program of improvements was instituted early in the 1950's. The scheme included the provision of 60 diesel railcars, new passenger and freight vehicles, steam locomotives capable of operating on oil or turf (for emergency use) and improvements to freight depots and other property. Government approval was secured in 1953 and the estimated cost of the program was £11.65 million. These improvements did not produce the hoped-for results and in 1956 the Government decided that the unsatisfactory state of affairs could not continue. A committee was appointed "to inquire into and review the developments in internal transport in recent years as they affect public transport undertakings; to consider what measures are necessary in the light of those developments, to ensure the provision of the transport requirements of the country on a basis which will serve the public interests; and to report thereon to the Minister for Industry and Commerce."

Setting the Goal

The Committee, with J. P. Beddy as chairman, produced a lengthy report which analyzed the position of CIE. The main points were these:

1. Because of its geographic position, size of population and economy the volume of traffic in Ireland is low.
2. In spite of this, public and private transport facilities were in excess of what were required to handle available traffic.
3. CIE's difficulties arose because of the heavy losses suffered on their railway operations.
4. The railways had been unable to recover their high and rising costs because of customer resistance and alternative forms of transport.

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Dr. S. C. Andrews
CIE Chairman

Connor Clune
Area Manager
Dublin

Kieran Brady
Deputy Area
Manager,
Dublin

Liam Dunne
Area Manager
Cork

John Higgins
Area Manager
Limerick

Patrick Murphy
Area Manager
Galway

William O'Neill
Area Manager
Waterford

Hostesses are popular with CIE customers.
Les clients de CIE apprécient les hôtesses.
Hostessen sind bei den CIE Gästen beliebt.
Las camareras del CIE gozan de popularidad.

IRISH TRANSPORT
CONTINUED

5. Rail traffic density was low, locomotive and rolling stock utilization poor and there were relatively excessive numbers of railway workers.

Other points in the report provided an even more depressing picture of the railway side of CIE. To a large extent the obsolete equipment affected the public's image of the system. Common carrier obligations affected the commercial flexibility of the undertaking while the basis for rail rates dated back to the last century and bore little relation to the cost of providing the services. The report suggested that "the railways should be given a limited period of years in which to show that their continuance can be justified in the national interest."

It is from this last sentence that has arisen the present position whereby CIE has until March 1964 to achieve at least a break-even position. The report did not recommend abandonment, subsidies or restrictions on other forms of transport. Instead, it was suggested that the railway system should be cut from 1918 miles to 850 miles; that road and rail services should be coordinated; that greater freedom be given to close unremunerative lines quickly; and that there should be a greater measure of commercial freedom. There were two other important points in the report: the number of employees should be reduced; and that the CIE Board should have a full-time chairman and at least two full-time members instead of the existing Board with its full-time chairman and six part-time members.

New Management Look

Following the publication and study of the report, the Board of CIE was reconstituted and Dr. S. C. Andrews was appointed chairman. Previously head of the Irish peat industry, Dr. Andrews is not a railwayman but rather a professional manager. This is why some of the most fundamental changes have been in the management sphere. The existing management structure grew from past amalgamations and was unwieldy and overcentralized. To counter this, five areas have been established with headquarters in Cork, Limerick, Galway, Waterford and Dublin. Each area manager has a large degree of autonomy and is assisted by a small administrative staff of experts to deal with the various departments: commercial, accounting, operating, engineering, etc. The five area managers are all under 40 years of age, the youngest being 30. Three were selected from CIE and the other two were recruited from outside organizations. Their basic task will be to more closely integrate CIE's road and rail operations and promote them both impartially.

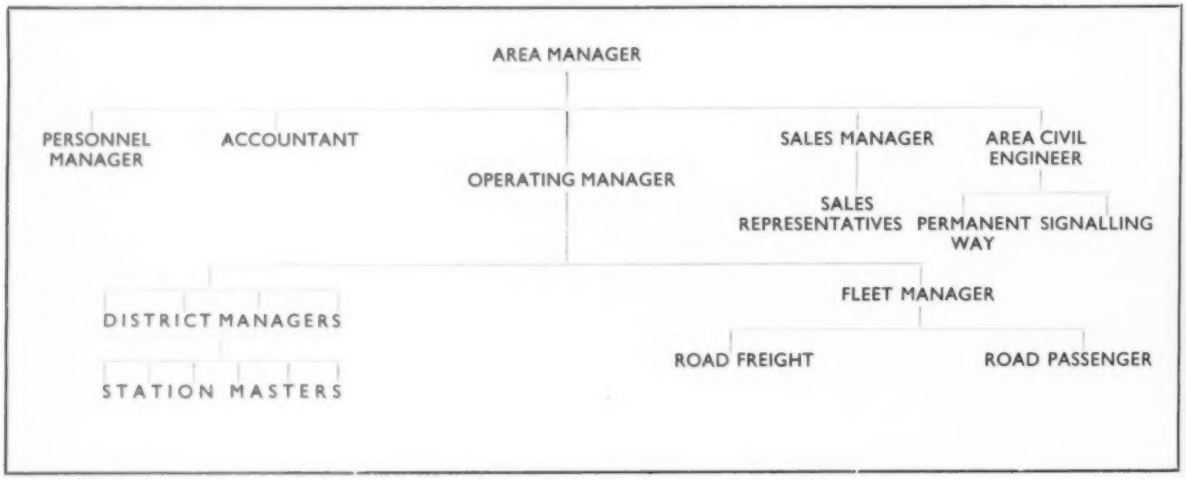
Typical of these new managers is John F. Higgins, age 30 and Dublin-born, who joined CIE in 1955 after completing a postgraduate apprenticeship with Metropolitan-Vickers. Initially he spent some time in the technical department of CIE and in the system's Inchicore works. In 1958 he took over the production department at Inchicore.

Since being selected he and the other area managers have undergone an intensive training course. Between one and two weeks were spent in each department to gain an insight of its purpose and activities. There was a one-month visit to the Continent, most of the time being spent with the Netherlands Railways examining their decentralized management. The balance of the time was spent in Switzerland. This visit was considered of great value—particularly the study of the Netherlands operations.

Mr. Higgins has complete executive authority and is functionally responsible to headquarters departments. His terms of reference and job specification have been drawn up in detail.

To help the board in its task of streamlining the organization, consultants were brought in to examine the management structure and operations. It was considered that economies would be possible by the maximum integration of accounting and clerical procedures. To achieve this, in 1960, a small team was established to undertake work study. It is investigating clerical routines in various departments in an effort to simplify and rationalize procedures and mechanize them where suitable.

A training department has recently been inaugurated with a training officer,



Key to CIE Progress

Mr. M. O. Ciosoig, who has studied management education and economics in Britain, the Continent and the USA. His work will entail the provision and supervision of training facilities for employees at all levels. He will determine, in consultation with departmental officers, the need for special training and education. Training is a new concept and particularly important in view of the morale of the organization which has suffered until recently from the effects of its economic sickness.

Joint consultation has been established with the trade unions and staff at all levels and six labor liaison officers have been appointed. The close relations between the Joint Consultative Council and the unions have enabled the big question of redundancy to be resolved. Obviously one of the features of the reorganized CIE is a reduction in staff. Where redundancy arises, staff can usually be offered alternative positions on the system or they can leave the company's employment on satisfactory terms. The compensation payable to displaced employees is paid by the government.

Not only is CIE planning for its 1964 break-even deadline, it is also planning for the future. A development department is being established and part of its task will be to study trends in traffic and plan accordingly.

One of the first and essential steps that had to be taken by the new board was that of closing down uneconomic lines. Previously the procedure for closing any line had been long and cumbersome and invariably involved public criticism. The board now has complete power to close a route on two months' notice. However, as a matter of principle, it has always given longer notice than is required.

Closures or alterations to services are not undertaken lightly. For example, for six months in 1959-60 operations on the Dublin-Bray line—which was losing over £130,000 a year—were studied. As a solution services were completely recast, the new pattern of schedules starting in mid-June, 1960. By maintaining good peak morning and evening services and eliminating the lightly used off-peak schedules, only half the previous rolling stock was required. Five stations in the Dublin area, which were well served by buses, were closed, which also reduced the journey time of those passengers traveling longer distances. All changes were made in close consultation with the staff and trade unions. A month before the revised services began passengers received a booklet containing full details of the new schedules. It explained the reasons for the

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Diesel trainsets handle 20–25 per cent of passenger traffic.
Des rames Diesel se chargent de 20–25% du trafic voyageurs.
Diesel-Züge übernehmen 20–25 Prozent des Personenverkehrs.
Ramas diesel transportan 20–25% del tráfico de pasajeros.

New passenger cars are CIE-built at Inchicore works.
Nouvelles voitures construites par CIE à Inchicore.
Neue Personenwagen aus den Inchicore-Werken der CIE.
Nuevos coches construídos por el CIE en Inchicore.

Good Service, Aggressively Sold, Attracts Passengers and Fre

IRISH TRANSPORT
CONTINUED

changes, the new timetable and fares structure. Further closures have also taken place or will do so very shortly. They include the West Clare, West Cork and Waterford-Tramore sections of the network. The change from rail to road will cut CIE working costs by £80,000 a year. Closure of two other routes is under consideration unless certain traffic commitments, now being negotiated, are secured. Following these substitutions of road for rail service, no further cuts are envisaged during the next five years except closure of some small stations.

In the past public criticism of CIE has been intense, although not necessarily well-informed. Because of the new moves—some of which, like the closing down of lines, were unpalatable—the chairman has made a particular point of establishing effective public relations. Aware that unreasonable criticism tends to corrode the confidence and morale of staff, he has stated that "in my opinion the first step . . . is to make well known a consistent and coordinated policy; to tell the public what we are endeavouring to do and to keep them informed of our progress."

Passenger Traffic

In 1956 passenger train receipts represented 39 per cent of all rail receipts and 18 per cent of receipts from all sources. The introduction of diesel railcar trains had obviously stemmed to some extent the decline in traffic in the years immediately before the new CIE board took over. Since then new named trains have been introduced on key routes. These are composed of the latest stock and feature train hostesses. These girls have proved very successful, assisting passengers, looking after unaccompanied children and the elderly or infirm, supplying minor first aid, etc. They also report back to management with useful comments or suggestions received from passengers.

Present plans call for all main-line trains to be brought up to named-train standard. Cars are being modernized with the emphasis on thermal and sound insulation. The passenger sales division is making a determined effort to increase traffic—particularly group traffic. Educational tours, for example, rose from 23,000 persons in 1959 to 89,500 before the end of 1960. By the end of the financial year on 31 March 1961 the division was confident that the 100,000 mark would be topped.

Advertising has changed from straightforward train announcements to copy that sells travel. Advertising expenditures were increased 100 per cent in 1959 as compared with 1958, while 1960 appropriations showed a further 30 per cent increase.

Freight Traffic

When the 1956 committee was investigating CIE it found that although freight traffic was increasing its character was changing. As receipts from freight represent 60 per cent of all rail revenue it is of considerable importance. With ratefixing flexibility the freight sales division has gone all out on "package deals" whereby it handles all a client's freight on an annual contract basis.

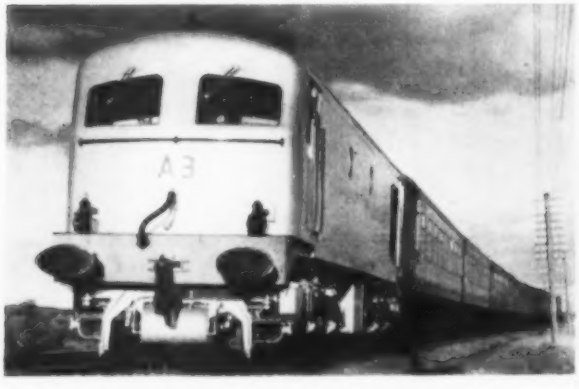
In Ireland, as elsewhere, a major competitive factor in the transport field is the use of private trucking fleets by shippers. CIE, drawing on its own experience as an operator of road services, has been able to provide its salesmen with a useful tool in the form of specific cost data on motor-truck operations.

Faced with a potential shipper who says "Well, I have my own road fleet, and it costs me less to haul my own goods," the salesman is in a position to compare the shipper's own cost figures with those of CIE, truck for truck and model for model.

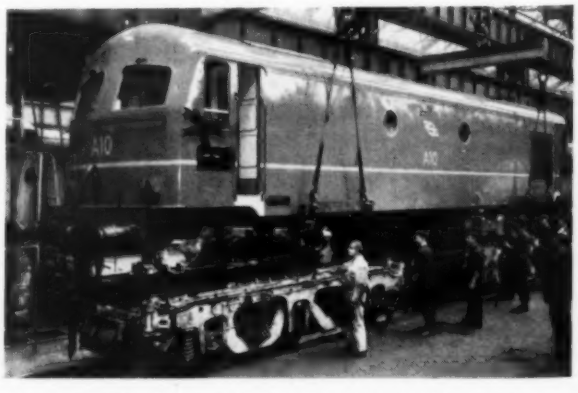
The package plan has been a great success and in the first 12 months a total of 342 contracts were negotiated with an annual potential of £235,000. Encouraged by this success the new business target for 1960 was set at £500,000 and with a number of months to go a figure of £347,000 had been reached—£163,500 for rail and £183,500 for road. Package deals have been secured with various types of traffic—livestock, fertilizers, motor vehicles, grain and millstuffs, coal and butter.

Freight sales manager G. Troy commenting on this has said "the salesmen's drive in securing the business is only the initial step. We must carry the traffic and in doing so afford a service to the full satisfaction of the trader and by that to establish our representatives in the traders' eyes as sellers of a quality product."

Coinciding with the drive for traffic is a parallel campaign to insure that freight is handled correctly. This covers such subjects as clean cars, safe stowage and securing of loads, care in switching and discharge of loads and protection of loads from bad weather.



Dieselization is nearly complete; 1200-hp unit.
Diésélisation presqu'achevée; locomotive de 1200 CV.
Die Verdieselung ist beinah beendet; 1200-PS Einheit.
Dieselización está casi completa; unidad de 1200 CV.



After overhaul at Inchicore 1200-hp Co-Co diesel re-enters service.
Après révision la 1200 CV Co-Co diesel est remise en service.
Diese 1200-PS Co-Co Diesellok wurde in den Inchicore-Werken überholt.
Una locomotora diesel Co-Co de 1200 CV recorrida vuelve al servicio.

Freight; Diesels Are Important in Modernization Program

In order to meet changing patterns of demand and to meet new conditions, CIE is paying increasing attention to such things as:

- Better terminal facilities.
- Introduction of modern handling techniques—some of which, such as pallet trucks, are already in use.
- Expansion of the container fleet, including special types. Latest examples under construction at Inchicore are of all-riveted light alloy.
- Development of facilities for bulk traffic—such as grain.

Like the Netherlands Railways, CIE operates its freight services during the night when passenger traffic has ceased. This improves utilization of track and motive power. Each night roughly 7500 tons of merchandise are moved and all movements are controlled from a central control office at Amiens Street station, Dublin, which works around the clock.

Among the containers in use are "Lancashire flats" which are designed for the movement of large unit loads of up to 11 tons by rail or road. A cross-channel container ferry service has also been inaugurated between Ireland and England in order to offer a door-to-door service for Irish exporters.

There has also been a complete investigation into the utilization of freight cars and a new repair shop has been built at the Inchicore works at Dublin. Roughly two-thirds of all car repairs are carried out at Inchicore with the remaining one-third at Limerick.

Light-alloy container built at Inchicore is used in Ireland–England ferry service.
Container à alliage léger construit à Inchicore pour le service ferry Irlande–Angleterre.
Leichtmetall-Behälter in Inchicore gebaut, wird für den Fährdienst Irland–England benutzt.
Container ligero construído en Inchicore para servicio de ferrobarcos entre Irlandia e Inglaterra.

Motive Power

In 1950 CIE had 451 steam locomotives and five diesel-electric switchers. The steam power was old and long overdue for replacement and 28 per cent of the total was under or awaiting repair. An investigation showed that the large-scale introduction of diesel power would result in an annual economy of nearly £1 million on fuel. A smaller number of units would be necessary, reducing operating and maintenance costs, while there would be additional savings from such things as the elimination of coal and ash handling.

GM 950-hp unit is latest CIE diesel.
GM 950-CV, dernier modèle CIE diesel.
Eine GM 950-PS ist die letzte CIE-Diesellok.
Unidad GM de 950 CV, nóvisima del CIE.

The first order for diesels had been placed in 1945 with Brush Electrical Engineering Co. Ltd. for engines and electrical equipment for five 487-hp diesel-electric switchers. The units were assembled at Inchicore and went into service in 1947 and 1948. In 1946 orders were placed with Sulzer Bros. Ltd. for 815-hp engines and with Metropolitan-Vickers for electrical equipment for main-line mixed traffic locomotives and two of these units were built at Inchicore.

In 1950 an order was placed for 20 railcars with AEC, Ltd., and this was subsequently extended in 1951 to 60 vehicles. Engines and transmissions for six more which were built at Inchicore were ordered in 1954. With these 66 railcars, which had a maximum speed of 120 km/h, better passenger train schedules were possible—such as 180 minutes for the 265-km Dublin-Cork run.

The next step came when tenders were invited for the main fleet of diesel locomotives which consisted of 60 1200-hp Co-Co's, 12 815-hp AlA-AlA's and 34 550-hp Bo-Bo's. All had electric transmissions, the 1200-hp and 550-hp types being built by Metropolitan-Vickers and equipped with Crossley engines. The 815-hp type has Sulzer engines, Metropolitan-Vickers electrical equipment and mechanical parts by the Birmingham Railway Carriage and Wagon Co. In addition 18 400-hp diesel-hydraulic locomotives were built at Inchicore and these embodied Maybach engines and Mekydro transmissions; three 130-hp diesel-hydraulic switchers were obtained from Deutz.

With the existing diesel railcars and this fleet of diesel locomotives—which could operate on an "all system" basis—the majority of traffic is diesel powered. Steam locomotives that remain are principally for standby purposes. In 1958 when CIE took over the part of the bankrupt Great Northern Railway that was in the Republic, it acquired more steam locomotives and did not have surplus diesel power to replace them. This led to an order being placed with General Motors for 15 GL8 950-hp diesel-electrics. These units, capable of 124 km/h and intended for main-line service, are now in course of delivery. At the same time an order for 14 sets of diesel engines and hydraulic transmissions was placed with Maybach. The engines are of 400 hp and the locomotives will be assembled at Inchicore—a method which utilizes the capacity of the works and also saves money. These units, with a maximum speed of 73 km/h and a weight of 40.5 tons, will be used on freight and branch line services. Also on order from Deutz are seven 22-ton 160-hp diesel-hydraulic switchers. When all this new motive power is delivered there will be 139 diesel locomotives and

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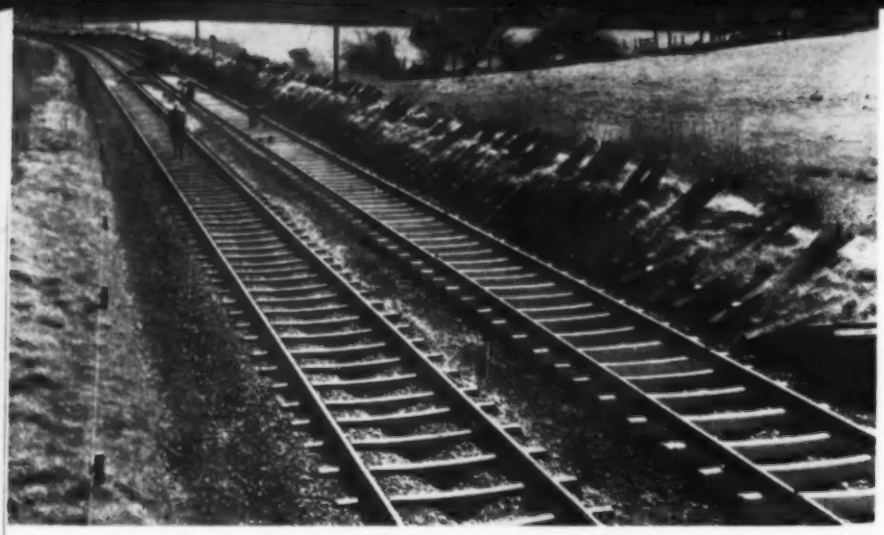


Concrete sleepers of German design are being used more widely on CIE.
Traverses en béton, modèle allemand, utilisées extensivement par CIE.
Betonschwellen deutscher Konstruktion werden vielfach bei CIE verwendet.
Traviesas de hormigón de diseño alemán se emplean más y más por el CIE.

IRISH TRANSPORT CONTINUED

93 diesel railcars which, between them, will be able to handle 92 per cent of all traffic. The eventual aim is, of course, complete dieselization.

Inchicore Works

The Inchicore works in Dublin is the only major railway works in the Republic. Established over 100 years ago, the plant has built many steam locomotives as well as rolling stock. When diesels were introduced maintenance and service was a serious problem, as the works had no previous experience with this form of power. It was intended that most of the scheduled inspection and running maintenance should be carried out at the plant. A workshop, formerly used for boiler and tender repairs, was remodelled at a cost of £64,000. It has four servicing and inspection bays with three working levels for easy access to all parts of the locomotives. Piped services to each bay include fuel oil, lubricating oil, compressed air, demineralized water for batteries and chromated water for engine cooling systems. Electrical connections are provided for battery charging and inspection lamps.

There are special departments for the testing, calibration and overhaul of injectors and fuel pumps and for cleaning, oiling and draining of air filters and the testing of instruments. Other facilities include electrical department, machine shop, foundry and toolroom. The heavy repairs and overhaul shop is also well equipped. The policy for heavy engine repairs is to bring the locomotive in, exchange the power unit for another one and send it back into service.

A separate overhaul shop is provided for the railcars and here a railcar engine can be replaced in four hours. Engines, gearboxes and transmissions are dealt with on a unit replacement basis by reconditioned units supplied by a separate department engaged solely on engine and gearbox repairs.

Training of existing staff in new techniques as well as recruiting additional personnel was another problem which had to be tackled in the early stages of changing over from steam to diesel.

Other departments at Inchicore are responsible for building rolling stock. Passenger cars are now being turned out at the rate of 25 a year while the freight car program is now limited to replacements. In passenger car building the constructional methods and materials used are designed to be economic and within the scope of the facilities available. For this reason cars have wood bodies on steel underframes. Latest material for paneling is a resin-bonded substance which has a veneered surface on one side and aluminum sheet on the other. Floors are blockboard, the inner ceiling skin plywood and the outer roofing of aluminum sheet. Body frame supports are of laminated wood construction. Underframes are all welded while bogies are of the cast steel Commonwealth type. At present the changeover from brush to spray painting is being considered.

In 1958 work study was introduced at the works with the assistance of a firm of consultants. Although the unions and the men, as a whole, cooperated in its introduction, an unofficial strike of fitters took place in the diesel locomotive overhaul shop. The dispute lasted 12 weeks after which work study was resumed. The works were also reorganized, including a fresh layout for the machine shop, the installation of new equipment and the conversion of the smithy to oil burning.

These changes were followed by a new system of production control which covered the foundry, machine shop, boiler shop and smithy. Standard times for all operations, as measured and proved by work study, form the basis for the scheme. It has proved to be a simple and reliable means of controlling output, providing job progress information and facilitating cost and labor control.

All jobs are broken down into separate operations with a time for each one. These times are used to pre-load the workshops. By means of simple clerical procedures the actual progress is visually compared with planned progress. Indication is also given of the stage any job has reached or the reason for any delay.

Although Inchicore employs fewer personnel (now 1500) than it did at one time, there is a much higher degree of productivity as well as the rationalization of operations.

Track and Signaling

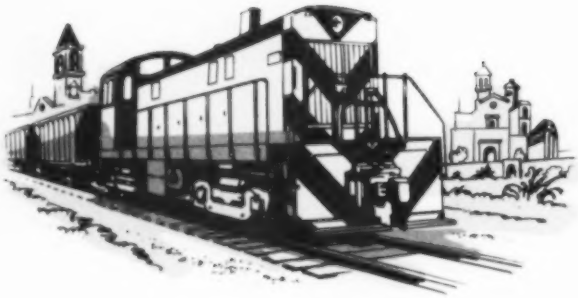
Among track developments has been the production of concrete sleepers. The German Federal Railways pattern is used and production started in 1956 and is now running at the rate of 500 a week. Rails are also being welded into lengths of 41.13 meters and 62.46 meters. Welding is usually done in situ using the French thermit method and about 97 km of welded rail have now been laid.

Signaling developments have largely been concentrated in the installation of track circuiting and three-aspect color lights in the Dublin area. This is on suburban routes where the traffic justifies such equipment.

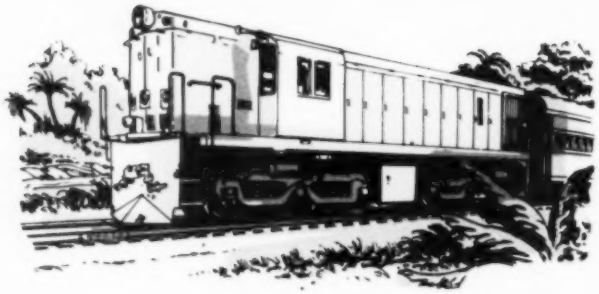
"A Transport Network"

CIE is aiming at an integrated transport system which, as the chairman, Dr. Andrews says, is "not just a rail system, not merely a road system, but a transport network." Furthermore it aims to pay its way by 1964 through intensive selling, management reorganization, new equipment and the best use of its greater "freedom." Earlier in its history it proved that dieselization alone—although providing economies—was not a cure-all for a system which was too big for a country's needs. Pruned to the right size, with a forward-thinking management linked to modern motive power and other equipment CIE may soon join the select ranks of Europe's transport systems that break even.

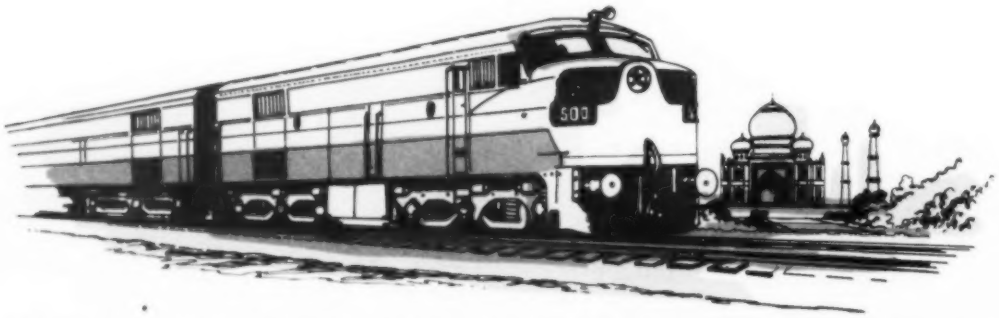
ALCO
ALCO
SERVING
RAILWAYS
AROUND
THE WORLD...



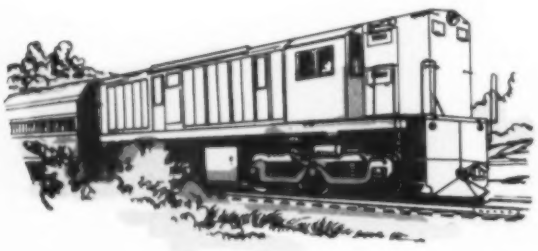
DL-430 FOR SHUNTING, TRANSFER AND BRANCHLINE SERVICE, FROM 22.2 METRIC TONS PER AXLE, GAUGES: 4'8½" AND OVER. **975/900 HP**



DL-531 – LIGHT WEIGHT, REDUCED CLEARANCE LOCOMOTIVE FOR PASSENGER, FREIGHT AND SHUNTING SERVICE, FROM 11.3 METRIC TONS PER AXLE, GAUGES: METER AND OVER (36" ON SPECIAL DESIGN). **1050/950 HP**



DL-500-C – FOR PASSENGER AND FREIGHT SERVICE, MEETING THE BERNE INTERNATIONAL CLEARANCE DIAMGRAM, FROM 16 METRIC TONS PER AXLE, GAUGES: METER AND OVER. **1950/1800 HP**

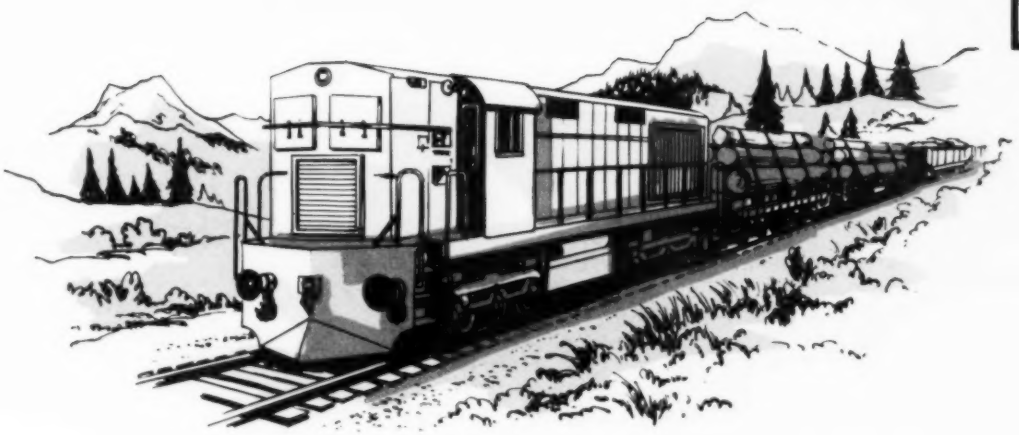


DL-535 – MEDIUM-POWERED, MULTIPURPOSE LOCOMOTIVE BUILT TO EXTREMELY REDUCED CLEARANCES, FROM 11.25 METRIC TONS PER AXLE, GAUGES: METER AND OVER (36" ON SPECIAL DESIGN). **1365/1200 HP**

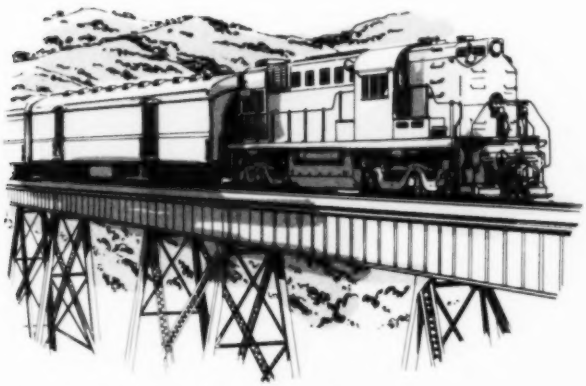
DL-701 – MAINLINE PASSENGER AND FREIGHT SERVICE, FROM 27.2 METRIC TONS PER AXLE, GAUGES: 4'8½" AND OVER. **1950/1800 HP**

DL-541 – MULTIPURPOSE LOCOMOTIVE MEETING RESTRICTED CLEARANCES, FROM 16 METRIC TONS PER AXLE, GAUGES: METER AND OVER. **1950/1800 HP**

ALCO



DL-560 – SIX MOTOR MAINLINE LOCOMOTIVE OF RESTRICTED CLEARANCES, FROM 19.6 METRIC TONS PER AXLE, GAUGES: METER AND OVER. **2600/2400 HP**



DL-702 – SIX MOTOR MAINLINE FOR PASSENGER AND FREIGHT SERVICE WHERE VERY HIGH TRACTIVE EFFORTS ARE DESIRED, FROM 21.5 METRIC TONS PER AXLE, GAUGES: 4'8½" AND OVER. **1950/1800 HP**

DL-600 – SIX MOTOR MAINLINE LOCOMOTIVE COMBINING HIGH HORSEPOWER WITH VERY HIGH TRACTIVE EFFORTS, FROM 25.3 METRIC TONS PER AXLE, GAUGES 4'8½" AND OVER. **2600/2400 HP**

ALCO LOCOMOTIVES COMBINE THE PROVEN MODEL 251 ENGINE WITH WELL-TRIED BOGIES OF HIGH ADHESION

ALCO locomotives are powered by the modern Model 251 engine, a product of over twenty-five years' development of high-power, turbo-supercharged engines designed primarily for railway traction. This development work is continuing to offer railways even higher power, greater economy and dependability.

The 251 engine follows a four-stroke, highly turbo-supercharged and aftercooled cycle, the one offering the highest thermal efficiency. Extensive tests on U.S.A. and overseas railways have proved that ALCO locomotives consume less fuel than any others in similar service.

Some of the outstanding features which give the ALCO 251 engine exceptionally long and economical life are: grooveless bearings; two-piece aluminum pistons with a hard, Ni-Resist insert for the top-ring groove; chromium-plated cylinder liners; replaceable hard-alloy valve-seat inserts; careful study of lubricating and cooling requirements; an exceptionally strong welded steel crankcase; and a hardened forged-steel crankshaft.

Many railways are finding that in heavy-duty service, they can space inspections of 251 pistons, rings, cylinders, valves and bearings from 36 to 48 months apart.

Another reason for the increasing acceptance of ALCO locomotives is the cast-steel fully equalized bogies, proven on all kinds of tracks. In particular, the three-axle ALCO trimount bogie allows for very high adhesion, a fact of importance where low or moderate axle loads are specified.

353 RAILWAYS IN 16 COUNTRIES CHOOSE ALCO LOCOMOTIVES

ALCO DL-500-C locomotive bound for India, for the haulage of heavy trains in graded sections.

Since 1848, ALCO has been serving railways the world over. As the American Locomotive Company, it was the world's leading builder of steam locomotives.

In 1924 ALCO built the first commercially successful diesel-electric locomotive manufactured in the U.S.A. It gave more than thirty-seven years of economical service. Since then, ALCO has built more than 20 million diesel horsepower.

The ALCO line of locomotives now offers models covering a wide power range, both for the generous clearances and axleloads in the U.S.A. and some other countries, and for the restricted axleloads and maximum dimensions found in many other railways of the world. In fact, a total of 353 railways in 16 countries have chosen ALCO diesel-electrics.

ALCO's most recent locomotive catalog contains specifications, tractive-effort curves and drawings of all ALCO locomotives. Write the ALCO office or associate nearest you, for a free copy.

SOME USERS OF ALCO LOCOMOTIVES

In Algeria	Algerian Railways
In Argentina	F.C. General Mitre F.C. General Sarmiento F.C. General San Martin
In Australia	New South Wales Government Railways South Australia Government Railways Silverton Tramways
In Brasil	Central Railway of Brasil Paulista Railway Company Rede Ferroviaria Federal S.A. Santos a Jundiai Railway
In Canada	Canadian Pacific Railway Canadian National Railways
In Cuba	Consolidated Railways of Cuba Nickel Processing Company
In England	Steel Company of Wales
In India	Indian Railways
In Mexico	National Railways of Mexico Ferrocarril Mexicano Altos Hornos de Mexico SA Cia Fundidora de Hierro y Acero de Monterrey F.C. del Sureste F.C. Sonora Baja California F.C. Pacifico F.C. Chihuahua-Pacifico Secretaria de Marina Cia de Cementos de Mixcoac
In Pakistan	North Western Railway
In Panama	Panama Canal Company
In Peru	F.C. Sur (Peruvian Corporation) Southern Peru Copper Corporation
In Portugal	Portuguese State Railways
In Saudi Arabia	Saudi Arabia Government Railways
In Spain	Red Nacional de los Ferrocarriles Españoles
In Uruguay	State Railways Administration

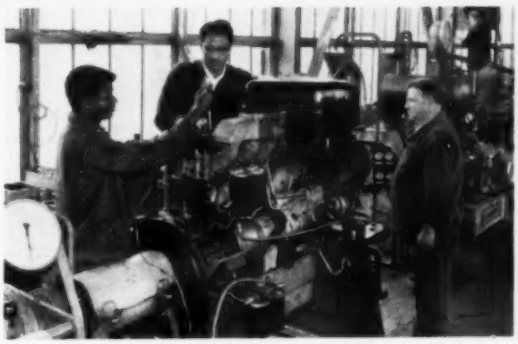
ALCO

ALCO PRODUCTS, INC.
530 Fifth Ave., N.Y. 36, N.Y., U.S.A.
Cable Address: Locomotive, N.Y.

FOREIGN ASSOCIATES AND LICENSEES: ALCO Products Export Co., Inc., 8 Grafton St., London; Montreal Locomotive Works, Ltd., Box 1000, Place d'Armes, Montreal; Associated Electrical Industries, Trafford Park, Manchester, England; A. E. Goodwin, Ltd., 315 Parramatta Rd., Auburn, N.S.W., Australia; Cia Euskalduna, Castellana 1, Madrid; Davey, Paxman & Co., Ltd., Colchester, England. Agents throughout the world.

Ghanaian technicians and Henschel engineers discuss diesel operation.
Techniciens et ingénieurs Henschel discutent l'usage diesel.
Techniker aus Ghana und Henschel-Ingenieure besprechen Dieselbetrieb.
Técnicos de Ghana e ingenieros de Henschel discuten operación diesel.

Henschel Promotes Its Exports by Technical Training



Program includes ample in-plant training.
Instruction intensive dans l'usine même.
Umfassendes Ausbildungsprogramm.
Formación intensiva en los talleres mismos.

Henschel-Werke GmbH, West German manufacturer of locomotives, trucks and heavy industrial equipment, is advancing its program to train workers and engineers from under-developed countries, the program to be financed out of company funds.

Shipments of Henschel locomotives and trucks to India, Egypt, Ghana and Syria, among other countries, made it apparent to the Henschel management that large exports to under-developed countries are only possible if the economy of these areas grows and with it the number of trained engineers, skilled workers, managers and office personnel, according to a recent statement by Henschel.

As an initial experiment, in 1958, Henschel-Werke invited trainees from India, Iran, Egypt, Kenya, Syria and Ghana. The participating trainees stayed at Henschel plants in Kassel for anywhere from three to seven months.

The educational program at Kassel is now being continued and the latest contingent of trainees—from Ghana—arrived toward the end of 1960. They will stay in Kassel for from two to three years and receive practical as well as theoretical training in the Henschel plants. Henschel-Werke supplies not only the training, but also pays for living quarters and food, and provides ample opportunity for the young Ghanaians to become acquainted with West Germany's leading universities, museums, technical schools, theaters, operas and other cultural institutions.

Besides the Ghanaians, Henschel has invited trainees and workers from West Africa, Equatorial Africa, Panama, Peru, Jordan, British East Africa, and the new Congolese Republic to participate in its continuing training program at Kassel, West Germany.

Henschel also recently established a school in Accra, capital of Ghana, where Ghanaians are given training in management and operation of railroads, trucks, diesel engines and other machinery.

Responsible for originating the Henschel training project is Dr. Fritz-Aurel Goergen, president and chief executive officer of Henschel-Werke since 1958.

Henschel Instruit Ingénieurs

Pour stimuler son exportation aux pays sous-développés la Henschel-Werke avance son programme pour l'instruction à ses frais des travailleurs de ces pays.

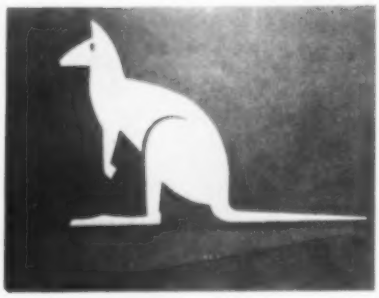
Henschel Schult Ingenieure

Zur Erhöhung ihres eigenen Exports nach unterentwickelten Ländern, beschleuningen die Henschelwerke ihr Programm, Arbeiter dieser Länder auf eigene Kosten auszubilden.

Formación Técnicos Henschel

Para aumentar sus exportaciones hacia países poco desarrollados, la casa Henschel fomenta por propia cuenta un programa de formación de técnicos.

Kangourous Among the Tulips?



Can piggyback bring freight traffic back to the rails in The Netherlands? Some members, at least, of the Netherlands Railways' freight sales staff think it can.

NS, like other systems, faces heavy and increasing competition from road haulers.

In Holland the problem is aggravated by the topography of the land: in a low-lying country crisscrossed by canals and navigable rivers, most of the heavy bulk shipments that form the basis of rail freight traffic elsewhere travel by water. The practical result is that a higher-than-usual portion of NS freight traffic falls in those commodity classifications most subject to road competition: manufactured goods and the like.

The importance of road competition is graphically illustrated in the railways' share of total Dutch freight traffic. While total rail tonnage has shown a slight increase in the last few years—on the order of one per cent—the total freight handled by all transport has grown 60 per cent in the same period, and the railways' share of all traffic has dropped from 15.9 to 12 per cent. Road traffic, on the other hand, has shown a spectacular increase.

Equally revealing is the finding of a statistical study recently published: 84 per cent of all international road traffic to and from The Netherlands has no effective competition; international rail traffic without competition amounts to 57 per cent, 17 per cent is in competition with road haulers, 13 per cent with both road and water, and 13 per cent with water alone.

For interior traffic the railways enjoy a somewhat better position—70 per cent of their interior traffic is without competition, 11 per cent subject to road competition, and 19 per cent to inland shipping competition.

The 17 per cent of international rail traffic that is subject to road competition is the first target of the studies NS is currently making of various piggyback systems. To test public and shipper reaction to the idea of piggyback, NS took advantage of the Royal Dutch Industries Fair—held at Utrecht from 13 to 22 March—to display two different types of piggyback equipment currently in use in France.

The display, arranged with the co-operation of the SNCF and with borrowed French equipment, attracted wide interest and included both the UFR system—employing a car of relatively conventional construction together with special low-clearance trailers— and the Kangourou, in which a conventional semi-trailer with minor modifications is carried on a specially-designed car with the trailer wheels lowered to just above rail level.

Members of the Dutch road transport industry have shown considerable interest in the Kangourou system; the UFR equipment—with a restricted payload and the need for special trailers—has on the contrary attracted little interest from the truckers.

NS officials stress the fact that Kangourou—or any other piggyback system—is still in the discussion stage, and that ultimate adoption depends on a number of unsettled questions.

One major question involves the permissible axle-load for trailers. Present Kangourou trailers are designed for French road conditions, with a permissible load of 13 tons per axle or 21 tons per tandem; Dutch limitations, however, hold the weight to eight and 16 tons respectively.

Anticipating this problem, NS personnel have developed a trailer design meeting the Dutch conditions, with an alternative design that would serve in the event of Dutch adoption of the French-German compromise formula which permits a load of eight tons on undriven and 10 tons on driven axles.

The cost for adding Kangourou fittings to existing trailers has been estimated at

CONTINUED ON PAGE 62

Piggyback pour la Hollande?

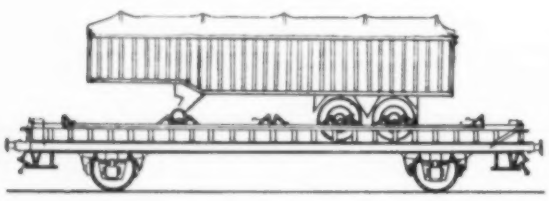
Les chemins de fer néerlandais étudient l'emploi du piggyback pour le trafic international. La première démonstration en Hollande du piggyback eut lieu le mois passé à la Foire d'Utrecht.

'Huckepack' für Holland?

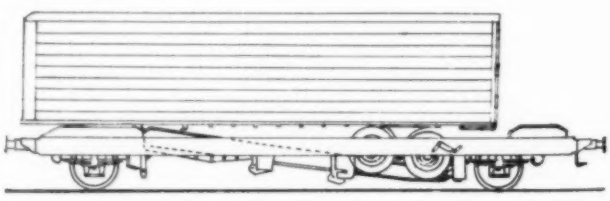
Die Niederländische Eisenbahn erwägt Verwendung des "Huckepack" für den internationalen Verkehr. Der "Huckepack" wurde zum erstenmal auf der Utrechter Frühjahrsmesse vorgeführt.

¿Sistema a caballo para Holanda?

Los FC holandeses examinan el empleo del sistema a caballo para el tráfico internacional. Este sistema se demonstró por primera vez el mes pasado en la feria de la primavera en Utrecht.

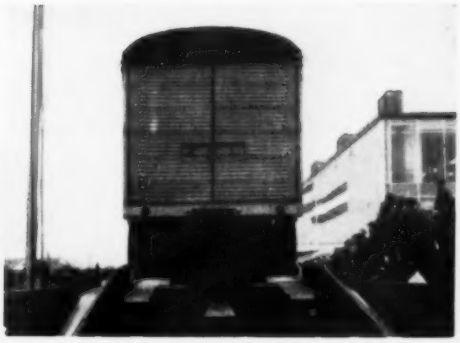


UFR

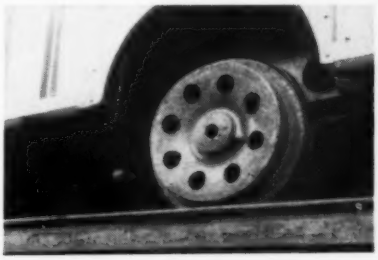


KANGOUROU

Holland Looks at Piggyback



Kangourou system (top) seems favored by Dutch truckers; objections to UFR system (below) include special design, limited trailer payload.
Système kangourou (ci-haut) favori aux Pays-Bas; objections du système UFR (bas) e.a. construction spéciale, charge utile limitée.
Känguruh-System (oben) scheint bei holländischen Verladern beliebt zu sein; Nachteile des UFR-Systems; spezieller Bau, geringe Nutzlast.
Los transportadores holandeses fomentan el sistema Kangourou (arriba); se oponen al sistema UFR a cusa del diseaño especial y la carga útil limitada.

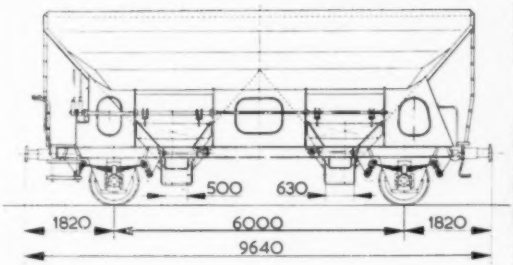


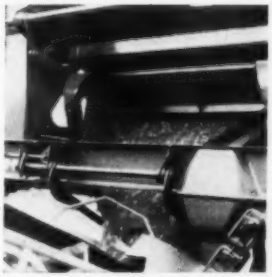
New Hoppers Will Fight Bulk-Traffic Competition

Side by side with the piggyback demonstration at Utrecht was a sign of NS determination to attack the other side of its freight-traffic problem, bulk traffic—one of the system's new 28-ton, 40-m³ open hopper cars.

One of an initial order of 250 now being delivered (first cars arrived in January, about 160 are now in service, and the balance of the first order are due to be delivered during the coming month) the car is another example of the NS determination to meet shipper needs. Altogether, some 1200 hoppers are to be added during the next three years. The bulk will be of open construction like the car shown at Utrecht, but 250 will be equipped with removable roofs.

The cars, ordered from Germany's Talbot works, correspond to those used on the German Federal; in two cases the DB and NS have pooled orders for the new cars. The car has four individually-controlled hopper doors, permitting discharge from two locations on each side, and is designed to accommodate conveyor belt equipment for unloading.





Venezuela: '

Trackside units scan passing journals.
Eléments balayant fusées passantes.
Abtastgeräte auf der Strecke für Zugachsen.
Unidades en la vía comprueban manguetas.

Scanners monitor both sides of train.
Balayeurs controlents deux côtés du train.
Abtaster kontrollieren beide Zugseiten.
Registradores comprueban ambos lados.

Employees are trained in maintenance.
Entrainement spécial pour l'entretien.
Arbeiter werden für Wartung getraint.
Equipos son ejercitados en mantenimiento.

'Hotbox' Detector Units

The Orinoco Mining Company, which operates a 144-km railway in Venezuela, has installed hotbox detector units at three points on its line. If an overheated journal is detected, an automatic alarm device activates a "stop" indication on a nearby wayside signal, so the train can be halted for necessary action by the crew.

The 144-km railway owned and operated by the Orinoco Mining Company in Venezuela is utilized exclusively for the movement of iron ore trains. A total of 15,000,000 tons of ore annually are moved from the mine site, atop Cerro Bolivar mountain, down the hillside and across rolling terrain to the inland river port of Puerto Ordaz. From here the ore moves by ship to markets in Europe and the United States.

Trains operate six days a week, six round trips a day. The 90-ton ore cars are moved in 105-car trains, each powered by three diesel-electric locomotives. Loaded trains move downgrade over much of the route. From the mine assembly yard at Cerro Bolivar an 11.3-km, 3.1 per cent descending track is utilized to reach the lower terrain.

Operation of heavy tonnage trains at rapid speed, plus the semi-tropical climate of the area, imposes unusual demands on freight car bearings. Bearing failures can cause derailments, and since the Orinoco line is single-track, an occurrence of this kind could result in serious delay to ore-shipping schedules.

To minimize the chance of such difficulty, the railway recently has installed hotbox detectors to provide early warning of freight car bearing failure and incipient bearing failure. These devices serve to alert train crews so remedial action can be taken before serious difficulty occurs.

Hotbox detector units are located at points 32.18 km from the origin of the line at Cerro Bolivar; at a point midway of the route; and at a third point 24.14 km before reaching Puerto Ordaz. These units, purchased from the Servo Corporation of America in Hicksville, N. Y. (USA), are designed to signal the train crew whenever a freight car journal is running at higher-than-normal temperature. The train can then be stopped, pursuant to wayside signal indication, so the crew can locate the source of potential trouble. Nearby trackage is provided in the event it is necessary to set a car out of the train.

Each detector unit is fully automatic and is comprised of several elements. An infrared trackside scanner, specially mounted beside the roadbed, detects the heat level of each passing journal. This information is instantly transmitted by overhead cable and recorded on tape in a "recorder house" 4.8 km ahead of the train. The tape record is a saw-tooth pattern of peaks and valleys—each peak representing the heat factor of the journal of a car in the passing train. If a bearing is running "hot" the peak on the tape rises sharply higher. The built-in alarm computer components are thus activated, and the nearby signal light on the railway goes automatically to a "stop" indication.

As the locomotive driver approaches, he notes the signal, and brings his train to a halt with the caboose near the recorder house. The trainmen enter the house, inspect the peak-and-valley record on the tape, and are able to locate quickly the exact car and journal where trouble is indicated. The journal is then inspected on the spot, and the conductor determines whether the car can be given sufficient temporary maintenance to proceed safely with the train, or must be set out on the nearby siding track. The hotbox signal is reset manually after the appropriate corrections are completed; and the train proceeds.

The mining company reports that the detector units have worked effectively since installation. In one recent month a total of 88 overheated journals were indicated.

While the detector units have thus functioned efficiently, and to the satisfaction of the railway, they do require occasional maintenance work. To prepare the railway's own personnel for this work, the Servo Corporation sent a special field engineer to Venezuela to conduct training programs. As a result, company employees now handle all detector maintenance.

Les Mines de l'Orinoco Utilisent Indicateurs 'Hotbox'

La société des Mines de l'Orinoco a installé des indicateurs de boîtes-chaudes à trois points de sa ligne de 144 km au Vénézuéla. Des éléments infra-rouge de balayage sont placés à côté de la voie pour controler toutes les fusées d'essieux des trains passants. Une documentation précise sur la chaleur de chaque fusée est transmise à l'enrégistreuse à 4.8 km devant le train. En cas d'une fusée surchauffée un système automatique d'alarme fait fonctionner un signal "stop" sur la voie, de sorte que le train peut s'arrêter pour y rémédier.

Orinoco-Bergbau verwendet Heissläufer-Angeber

Die Orinoco-Bergbau-Gesellschaft, die eine 144 km Bahnstrecke in Venezuela exploitiert, hat an drei Punkten ihrer Linie Heissläufer-Angeber aufgestellt. Infrarote Abtastungseinheiten sind an beiden Seiten des Schienenbettes montiert, um alle Wagenachsen der passierenden Wagen zu kontrollieren. Genaue Angaben über den Wärmegrad jeder Achse werden der 4.8 km entfernten Registriervorrichtung übermittelt. Wird Überhitzung einer Achse festgestellt, löst ein automatisches Warngerät auf dem nächsten Streckensignal ein "Stopp"-Zeichen aus, so dass der Zug für die notwendigen Massnahmen halten kann.

Cómo Orinoco Mining Descurre de Cajas Calientes

La Orinoco Mining Company que explota un ferrocarril de 144 kilómetros en Venezuela, ha instalado indicadores de cajas calientes en tres puntos de su línea. Unidades registradores infrarrojo han sido montadas al borde del asiento de la vía para comprobar todas manguetas. Se transmite información exacta sobre la temperatura de cada mangueta a un indicador que se encuentra 4,8 km. delante. Si una mangueta recalentada se registra, un aparato automático hace funcionar una señal cercana, para que el tren se detenga y el equipo pueda intervenir.

Britain: LTE Uses New Tunnel

New tunnel-construction methods being used in an experimental section of underground rapid-transit in London have been credited with establishing a speed record for tunneling through clay soil—1.15 meters per working hour.

The 1.609-km section of double tunnel now being built for the London Transport Executive between Finsbury Park and Netherton Road, Tottenham, will serve a double purpose. It is situated on the route of the projected 18.5-km Victoria tube line, and will be incorporated into the new line when construction is authorized. Meanwhile, the new tunnel sections are providing valuable experience and research results which will be applied to the Victoria line and to other new tube construction in the future.

Key to the speed of tunnel boring is the "Drum Digger," a boring machine of new design developed by Kinnear Moodie and Co., Ltd., contractors for one of the two sections of the new construction, and by Arthur Foster Constructional Engineers, Ltd.; it has been used previously in the boring of the much smaller Thames-to-Tees Valley water tunnel of the Metropolitan Water Board.

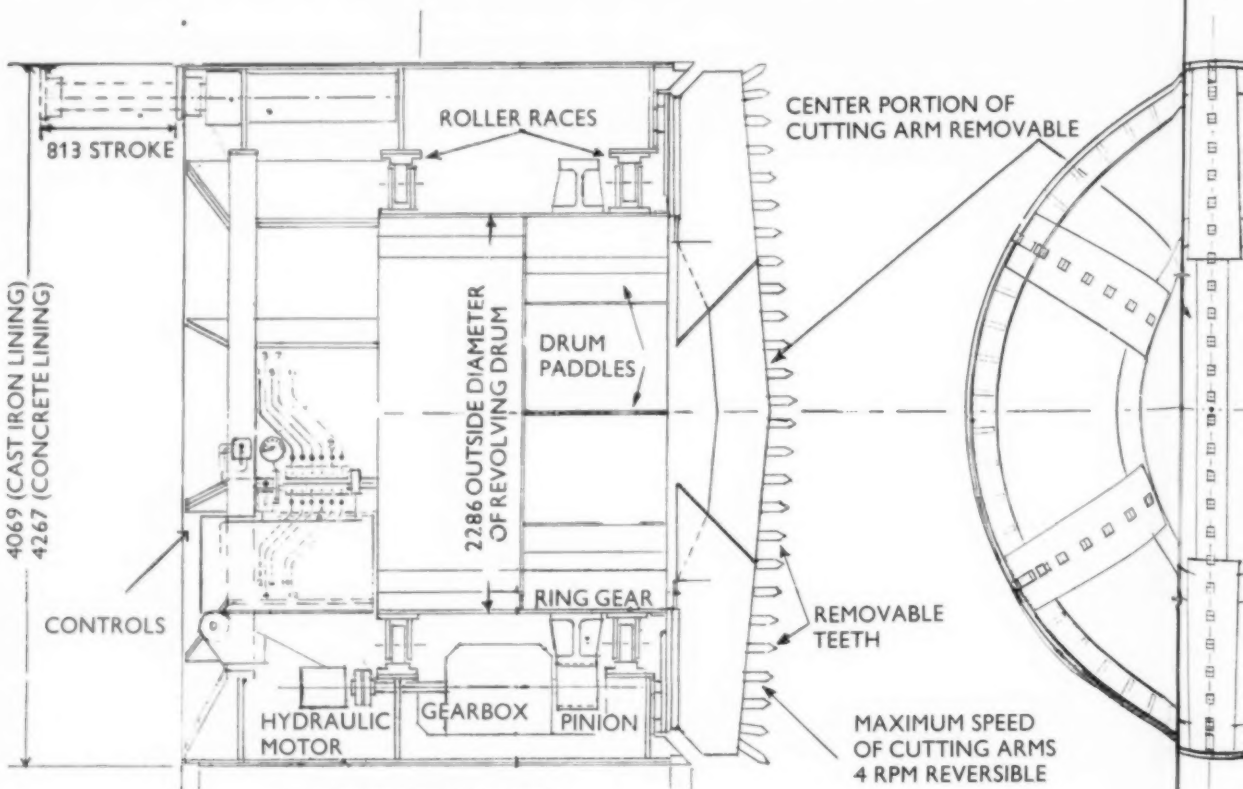
The drum-digger shield consists basically of two concentric drums. The outer drum for the larger-diameter section of tunnel has a diameter of 4.267 meters and is 2.956 meters in length; the leading edge of the drum is beveled to form a cutting edge. The inner drum, 2.286 meters in diameter and 1.829 meters long, rotates and carries six arms, each with eight cutting teeth which excavate the portion of the tunnel face between the inner and outer drums. The section ahead of the inner drum is excavated by teeth carried on a removable arm extending across the diameter of the inner drum.

The inner drum is driven at up to four rpm through gearboxes driven by six hydraulic motors; pinions on the gearbox output shafts engage a ring gear mounted on the revolving inner drum which is carried on two roller races and is provided with a thrust ring to take the axial load from the cutters. The hydraulic motors are controlled from valves within the shield.

Forward movement for the shield is provided by 14 hydraulic rams arranged equally around the shield and acting against the last completed ring of the tunnel lining. The rams have a travel of 813 mm and are capable of exerting a pressure of up to 295 kg/cm².

The ram operator is provided with sighting guides indicating whether the shield is on the correct line and level, and can control the pressure on any of the rams to correct any tendency toward deviation from the correct center line; the sighting devices can be adjusted to adapt to conditions found in the boring of curved tunnel sections.

The clay cut by the teeth of the machine



el Borer

is guided by scoops and paddles into a conveyor; through a second conveyor the spoil is directed into dump cars operating on a 610-mm construction track and powered by battery locomotives. The muck-loading apparatus is mounted on an articulated platform attached to the rear of the shield and drawn forward by the action of the hydraulic rams. When the shield has advanced by the length of one ring of tunnel lining—610 mm— the rams are retracted, a new ring is erected, and the process is repeated with the rams working against the newly-completed ring.

Considerable heat is generated in the boring process, and is dissipated by cooling water piped through a heat exchanger and cooler. Cooling-water pipes and power leads for the motors powering the hydraulic driving and ram circuits are extended as work progresses. The drum shield is capable, in full

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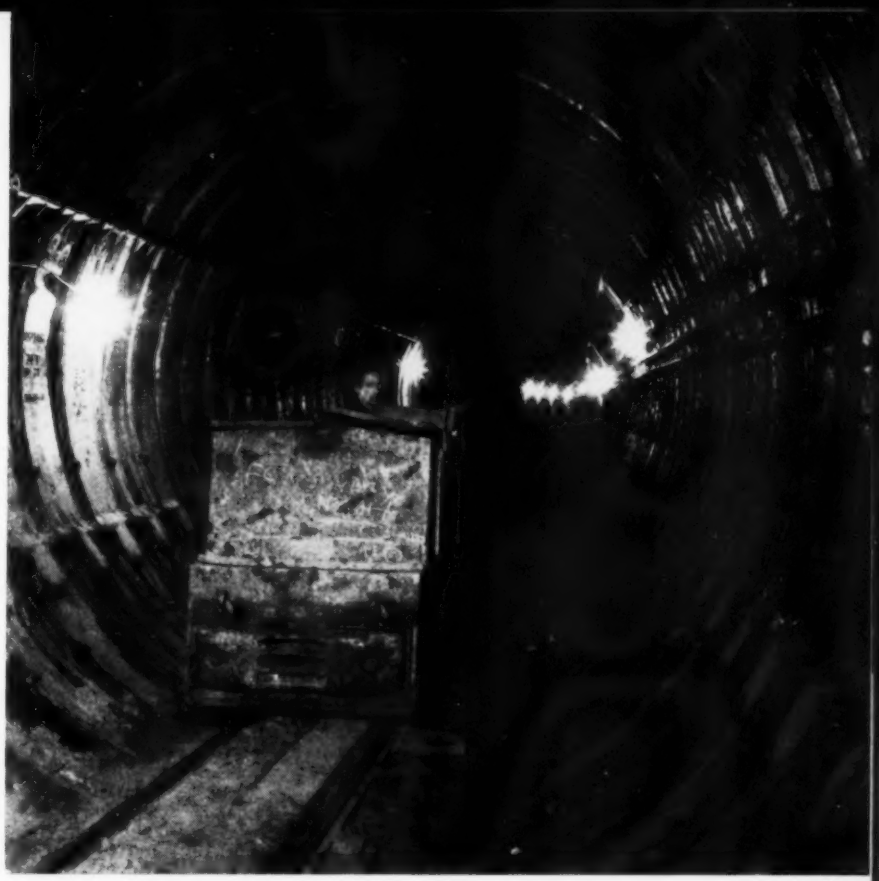
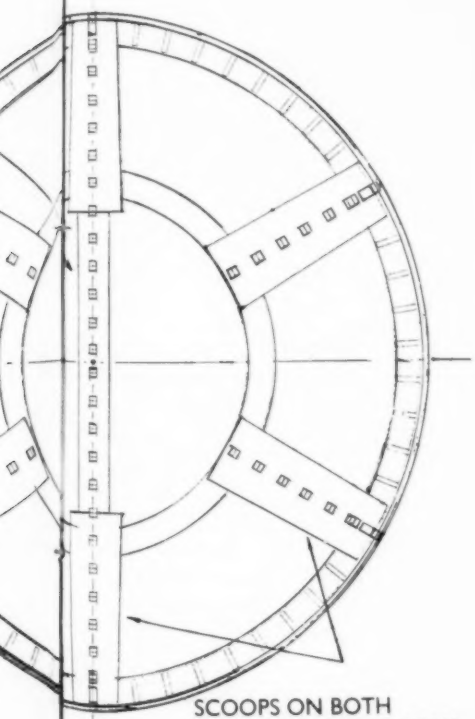




SCOOPS ON BOTH SIDES OF CUTTING ARMS

British Patent No. 762416

Nouvelle Machine, Nouveau Record pour Tunnels

Une nouvelle machine utilisée dans la construction d'un métro expiramental à double tunnel pour la London Transport Executive a établi un nouveau record mondial pour faire des tunnels dans le sol crétacé—1.15 mètres par heure. Le tronçon de 1.609 km, qui fera partie de la ligne Victoria projetée par la LTE, est utilisé par la même occasion pour essayer les nouveaux garnissages en fonte et en béton préfabriqué.

Neue Maschine leistet Tunnelbau-Rekord

Eine neue Tunnelbaumaschine, die beim Bau einer experimentellen Doppelgang-U-Bahn für die London Transport Executive verwendet wird, hat einen neuen Weltrekord für Lehmboden-Tunnelbau aufgestellt—1.15 m pro Arbeitsstunde. Die 1.609-km Strecke ist ein Teil der geplanten Victoria-U-Bahn der LTE und wird ausserdem für die Erprobung der neuerdings entwickelten Gangausmauerung mit Gusseisen und vorgeformtem Beton verwendet.

Nueva Máquina Bate el Record en la Construcción de Túneles

Una nueva máquina que se emplea en la construcción de un túnel doble experimental del London Transport Executive ha batido el record mundial en la construcción de túneles en tierra arcillosa—1,15 metros por hora. En la sección de 1.609 km., que formará parte de la línea Victoria del LTE, se ponen también a prueba revestimientos de hierro fundido y hormigón prefabricado.

working condition, of cutting up to 18.3 meters per 24-hour working day. The maximum obtained to date has been 26.82 meters in one 24-hour period.

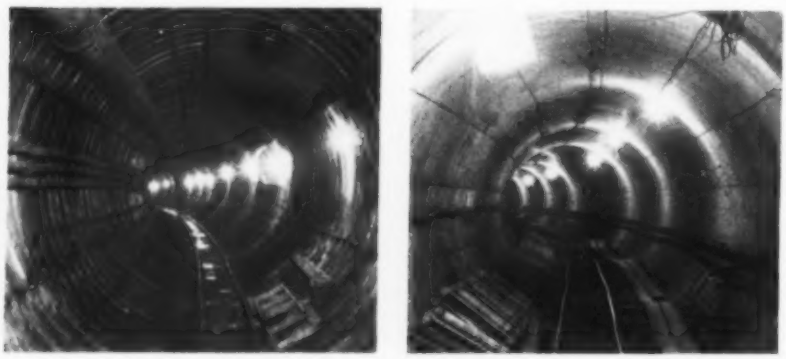
Except for having an outside diameter of 3.99 meters, the second drum digger in use is similar in design and operation.

Two Types of Lining

Two new types of tunnel linings are in use on the two segments making up the experimental length of double tunnel. That on the section being built from the Netherton Road site consists of unbolted cast-iron segments with flexible joints between each 610-mm ring. There are six segments of one-inch thickness in each ring; one end of each segment is convex and the other concave, so that knuckle joints are provided between segments. The two segments forming the floor of the tunnel are cast with small recesses at their upper ends; when all six segments are in place hydraulic jacks are fitted to the segments, creating a small gap between the rings as they are pressed outward against the tunnel walls. Each of the two gaps created is filled with two cast-iron knuckle pieces and two pairs of cast-iron taper packings which hold the whole ring in place when the jacks are eased off. Each ring segment has shallow interior ribs which are enlarged to form perforated lugs at regular intervals around the ring for handling purposes; the lugs, after construction, will serve to hold signal equipment, cable brackets, and other railway equipment.

The linings of the other tunnel section in the experimental project are also of a new type, of pre-cast concrete. The concrete sections are used in the larger of the two tunnel diameters; thicknesses from 114 to 229 mm have been used, and the final thickness used in future construction is likely to be 153 mm. Each ring is made up of 14 identical segments with knuckle joints. When all 14 are in place a gap of about 178 mm remains; this gap is filled with a pair of reinforced concrete folding wedges, driven home by a pair of small hydraulic rams. Each concrete segment has four equally-spaced holes for handling, which will eventually be used—with expansion bolts—for fixing equipment of the type carried on the lugs of the cast-iron segments.

Rear of tunneling machine; revolving inner drum carries cutters, hydraulic rams move shield.
Cylindre rotatif à déblayeurs, crics hydrauliques poussent l'appareil pour forer des tunnels.
Ende der Tunnelbaumaschine; drehende Innentrommel mit Bohrkronen; hydraulischer Rammblock.
Trasero de la máquina; cilindro giratorio tiene cortadores; arietes hidráulicos mueven el aparato.



Experimental tunnels use new lining methods, cast iron (left) and pre-cast concrete (right).
Tunnels expérimentaux, garnissage nouveau, fonte (gauche) et béton préfabrique (droite).
Experiment mit neuer Ausmauerungsmethode, Gusseisen (links), vorgegossener Beton (rechts).
Túneles aplican nuevas métodos de revestimiento, hierro fundido y hormigón prefabricado.

No Grouting Needed

No grouting is used with either of the linings, and there is nothing between the rings except for wood packing pieces inserted between the cast-iron rings to distribute the thrust of the shield rams.

It has been 21 years since a new section of tube railway was built by LTE, and 54 years since the last tube across central London was built. The experimental sections of tunnel are designed on the basis of information gathered in periodic testing, including the removal of lining in existing tunnels. Contracts for the experimental section were let early last year in two sections—Finsbury Park to Manor House and Netherton Road to Manor House. Total cost of the twin-tunnel experimental section is estimated at one million pounds.

Consulting engineers for the Finsbury Park-Manor House section (concrete lining) are Sir William Halcrow and Partners; Kinnear Moodie and Co. is the contracting firm, and the manufacturer of the lining segments is Charles Brand and Co., Ltd.

The cast-iron-lined section from Netherton Road to Manor House is being built by Edmund Nuttall Sons and Co. of London as contractors, with Mott, Hay and Anderson as consulting engineers. The cast-iron tunnel lining segments are produced by Staunton Ironworks, Head Wrightson, Smith Patterson and the Anderton Foundry.

The proposed Victoria line would connect Victoria Station with Walthamstowe via the West End, Kings Cross and Finsbury Park. While the project has been approved in principle, authorization of funds—estimated at approximately £55 million—awaits a decision of the Ministry of Transport.

SWEDEN: Swedish State Railways, in 1960, carried more freight traffic than for any other year except 1956; transported an all-time record quantity of iron ore; and experienced a small increase in passenger traffic.

SPAIN: A 9.6-km section of the Madrid Suburban Railway, from Plaza de España to Carabanchel, has been opened. It is part of a 16-km line designed to link Carabanchel with Chamartin de la Rosa. The recently-opened section has nine stations; is underground for 4 km, in the open for 5.6. A short extension of the Madrid subway's No. 1 line, from Tetuan to Plaza de Castilla, has also been put into service.

GREAT BRITAIN: British Railways have received government approval to continue with electrification of the London-Crewe main line—but the £175,000,000 project will not be completed until 1966, instead of 1964. In announcing this in Parliament, the Minister of Transport said it did not necessarily mean government approval of other main-line electrification plans. He further said there was need for greater productivity on railways; that modernization would cost the Treasury £140,000,000 this year, compared with £160,000,000 in 1960; and that the 1961 provision to cover BR's overall deficit would be £103,000,000 this year against £105,000,000 last year.

. . . Proposed forms of transport between central London and London airport—as an alternative to the present bus service—include a conventional railway line and a monorail system. The latter is being advocated by a French organization which says its system could carry up to 30,000 passengers an hour at 120 km/h.

. . . Cross-Channel motor vehicle ferries operated by British and French railways and Belgian Marine will be able to carry 5500 automobiles every 24 hours this year—an increase of 1500 over the 1960 capacity.

. . . Sulzer-engined Type 2 diesel-electric locomotives —some 66 in all—are being extensively used in Scotland by British Railways. The 1160-hp units, with Sulzer six-cylinder 6LDA28 engines, were built at BR's Derby shops and by Birmingham Railway Carriage & Wagon Co., Ltd.

. . . British Railways will add another 27 steam locomotives to the number (now totaling 71) they plan to preserve to perpetuate the story of steam in railroading. Accommodation for the collection has yet to be arranged.

. . . The first section—about 1.6 km—of new tracks being laid to quadruple 10 km of London Transport's Metropolitan line between Harrow North Junction and Watford South Junction has been put into service. A further section will go into use this spring.

. . . London Midland diesel multiple-unit trains are now working some of the suburban services out of London's Marylebone station. The 920-hp four-car sets each have two cars powered with twin B.U.T. 230-hp engines, and two trailer cars. Each set seats 332 passengers.

. . . New signal installations on British Railways include one at Plymouth, on the Western Region, controlling nearly seven km of track and replacing six older boxes; one at Tollerton, 16 km north of York on the North Eastern region, controlling 19 km of line; and a plastic relay room at Stanford-le-Hope on the Eastern Region.

SOVIET UNION: More than 1200 km of new railway lines are reportedly scheduled for completion during 1961.

. . . A new two-unit diesel locomotive—the TE-30—intended for both freight and passenger service, is being developed by a Kharkhov factory. By altering its transmission, its maximum speed can be increased from 100 to 140 km/h when it is shifted from freight to passenger operation. The TE-30 is said to have several advantages as compared with the current diesel, the TE-3. The new locomotive has the same 4000 hp, but is 18 tons lighter, is less expensive to build, and cheaper to operate, because it requires nine per cent less fuel.

. . . According to a recent Pravda report, Boris Beshchev, USSR Minister of Railways, has evaluated the first five years of electrification as follows: The program is slightly ahead of schedule, with 8483 km electrified up to the end of 1960, out of 40,000 km slated for electrification under a 15-year plan adopted in late 1955. Electrification of complete routes rather than individual sections has permitted longer locomotive runs, with crews working in shifts. This has saved 285 locomotives. With electric (and diesel) locomotives handling 43 per cent of all freight in 1960 —against 14.1 per cent in 1955—there has been a saving of 125,000,000 tons of coal and 1,700,000,000 new rubles. Electrification has led also to improved service; two days have been cut, for example, from the Moscow-Irkutsk run. Increasing use is being made of 25-kv AC at industrial frequency, which Mr. Beshchev said speeds up the rate and reduces the cost of electrification and saves three to four tons of copper per km on double-track lines. Further savings are possible through use of steel-copper trolley wire and steel-aluminum supporting wire. Among the 1400 km of line converted to AC traction are heavy-traffic sections of the Krasnoyarsk and East Siberian lines.

SWITZERLAND: Methods of connecting railway transport with internal factory movement of goods will be featured at the Swiss Industries Fair in Basle, 15–25 April. On display will be devices, models and pictures demonstrating loading and unloading of railway cars.

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Nouveaux Wagons Exhibés aux E.U.

Des spécialistes des Etats-Unis et du Canada étudient deux nouveaux types de wagons. L'un un wagon extra long à toit amovible à carrosserie à expression en aluminium. L'autre l'adaptation américaine de l'"autoporteur" européen.

Neue Güterwagen in den USA Ausgestellt

Eisenbahnleute in den USA und in Kanada machen Versuche mit zwei neuen Güterwagen-Typen. Der eine ist ein sehr langer offener Wagen mit abnehmbarem Dach aus gepresstem Aluminium. Der andere ist eine amerikanische Form des europäischen "Auto-Trägers".

Nuevos Vagones en los EE.UU.

Peritos ferroviarios en los EE.UU. y el Canadá estudian dos nuevos tipos de vagones. El uno es un vagón cubierto muy largo, de caja de aluminio, el otro una adaptación norteamericana del "auto-porter" europeo.

US Studies New Cars

Two new freight cars—one incorporating new and unusual structural techniques, the other familiar in concept on European railways but new to the US—have recently been introduced to America's railwaymen. The entirely new car is an extra-long covered gondola car with body construction of extruded aluminum structural shapes; the other is an auto transporter based on familiar German design but adapted to North American conditions.

The 26-meter covered gondola—designed for protected shipment of long loads such as finished metal shapes, sheet or strip—was developed by Harvey Aluminum Company, an independent California producer, in cooperation with the Rock Island railway and the North American Car Company.

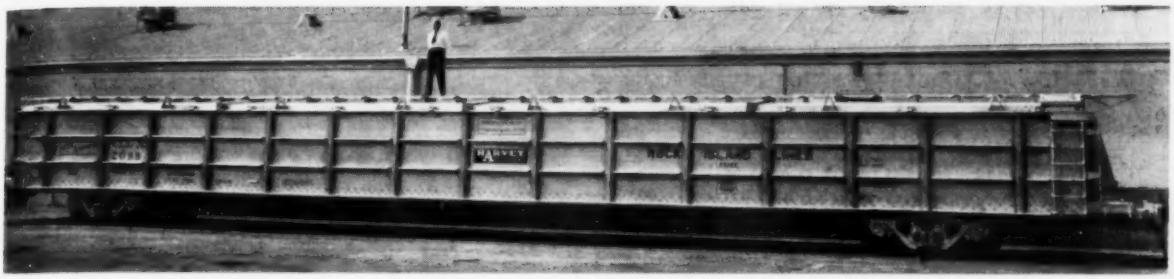
Chief novelty of the car's design—developed by the aluminum company's engineers—is the construction of the sides. Rather than the familiar construction of braced metal sheeting, each side panel consists of three aluminum extrusions, each 25 meters long and 635 mm wide, joined by their flanges, with additional vertical bracing. The roof consists of panel-type aluminum extrusions joined into four 6.1-meter sections. Roof sections are fitted with fastenings for easy removal by crane.

The car has a light weight of 34,150 kg. The aluminum superstructure itself weighs less than 4500 kg, compared with a total dead weight of about 41,500 kg for a comparable car of all-steel construction. Maximum load is just under 61,000 kg; capacity, slightly less than 92 m^3.

The car has generated enough interest so contract construction of others is under discussion. The prototype is leased to the Rock Island, but is owned by North American Car Corporation, which has long been prominent in the car-building field and in the leasing of cars to private owners, and has recently become active in the renting of specialized equipment to individual railways.

North American is responsible also for introduction of the "Auto-Porter," an Americanized version of a German double-deck articulated auto car.

North American recently displayed the car in Chicago, through the cooperation of B & W Enterprises, Inc., of New York. The B & W company is American agent for Joseph Graaff of Elze, West Germany, builder of the car now in wide European use—over 1000 are in use, are standard on German and Netherlands Railways.



▲ The Harvey Company's 26-m covered aluminum gondola car is designed for weatherproof shipment of extra-long loads.
Wagon découvert en aluminium de 26 m à toit amovible pour protéger charges extra longues contre les intempéries.
Der offene Harvey-Aluminiumwagen, mit abnehmbaren Dach, 26 m lang, für Wetterschutztransport sehr langer Güter.
Vagón cubierto de aluminio, 26 m de largo, para el transporte a prueba de mal tiempo de cargas muy largas.

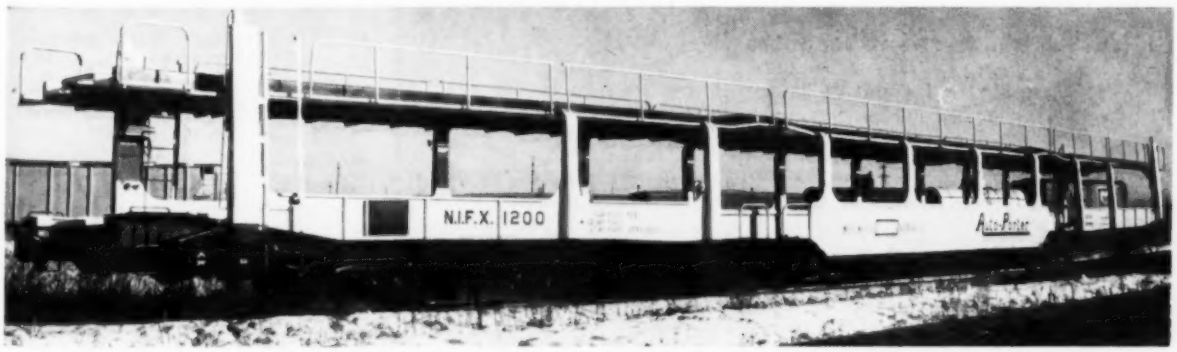
The Auto-Porter represents a far wider divergence from customary American railway practice than the aluminum gondola, chiefly through its use of individual axles with leaf springing rather than coil-sprung bogies. Individual-axle designs, although introduced occasionally in experimental cars, have found no widespread acceptance in America.

The car, while retaining the individual-axle, articulated design of its European predecessor, differs in consisting of three rather than two articulated sections, carried on four axles. Total length is 37.4 meters, compared with the 22.8 meters of the two-section European car, and floor level is 710 mm above railhead. Light weight is approximately 31,400 kg, and rated load limit is 23,000 kg. The car will carry 16 autos of US "compact" size.

While US and Canadian railways have recently shown considerable interest in extra-long bogie auto-transport cars—up to 25 or 26 meters in length—with two or three decks, the articulated design is expected to reduce clearance problems on curves, while the floor level will give improved overhead clearance.

Interest in the car has been stimulated by the rapidly-increasing traffic in finished automobiles on North American railways. E. C. R. Lasher, president of North American, said that the prototype car was shown "because it is our policy to give railroads and shippers the opportunity to examine the most modern and sophisticated technology in transport."

The "Auto-Porter," widely used in Europe, has been adapted for North American conditions.
L'"Auto-Porteur," en service partout en Europe, a été adopté aux conditions des Etats-Unis.
Der "Auto-Träger," in Europa sehr verbreitet, wurde in Nordamerika eingegeführt.
El "Auto-Porter," que se usa mucho en Europa, adaptado a condiciones norte-americanas.



RAILWAY OF THE MONTH:

Tokyo Electric Express: Profits From Passengers

- **High population density.**
- **Major cities located close together.**
- **Relatively little private transport.**

These factors have made Japan—and particularly the island of Honshu—one of the most railway-conscious areas in the world. In addition to the government-owned Japanese National Railways, there is a tight network of privately-owned railways, especially electrically-operated suburban and interurban lines, serving the metropolitan areas of Japan. The Tokyo Electric Express Railway (TKK) is one such line.

While other railways throughout the world are struggling to make a profit from suburban passenger traffic, TKK is faced with the opposite difficulty—how to accommodate customers.

TKK itself is a diverse operation, involving three main transport networks: one motor transport and two rail.

The rail network is sharply divided, consisting of high-speed suburban and interurban lines and a number of local tram lines. The diversity of the two systems extends to track gauge: the railway lines are built to a gauge of 1.067 meters, the prevailing gauge on the principal Japanese railways, while the tram lines are constructed with an unusual gauge of 1.372 meters.

The main line of the railway system is the Tokyo (Shibuya)—Yokohama "Toyoko" (the names of the two cities combined) line, 26.3 km long, which has the most modern equipment and fastest schedules (35 minutes by express train). Other railway lines are more suburban in nature, and include the system's first line, built in 1922, from Meguro to Kamata

Tokio: Voyageurs et Bénéfice

Tandis que beaucoup de sociétés de chemins de fer dans le monde font des efforts pour réaliser un bénéfice—ou jouent à peu près quitte—sur le service des voyageurs les TKK japonais envisage le problème inverse, c.à.d. comment accommoder les clients actuels et potentiels. Desservant la région à population dense Tokio-Yokohama, TKK, presqu'uniquement voyageur, se sert non seulement du rail, mais aussi de tramways et un réseau de lignes d'autobus, possède des investissements dans des projets de construction de logements et d'autres affaires et s'occupe actuellement d'un programme intensif de modernisation de l'outillage et du matériel fixe.

Tokio: Passagiere und Gewinn

Während viele Eisenbahnen in der Welt sich mühen, an dem Personenverkehr zu verdienen—oder wenigstens nichts zu verlieren—weiss die Elektrische Schnellbahn Tokio nicht, wie sie heute und in Zukunft ihren Personenverkehr bewältigen soll. Die TKK befördert in dem dicht bevölkerten Gebiet Tokio-Yokohama fast ausschliesslich Personen und umfasst Eisenbahn, Strassenbahn und Autobusverbindungen. Sie hat ihren ständig wachsenden Besitz durch Teilnahme an Wohnbauanlagen und anderen Geschäftsunternehmen sichergestellt und nun ein grosses Erneuerungsprogramm ihres Rollmaterials und ihrer ortsfesten Anlagen in Angriff genommen.

Tokyo: Pasajeros y Beneficio

Mientras muchos ferrocarriles de pasajeros se esfuerzan por realizar beneficio—o al menos costearse—al Ferrocarril de Tokyo se plantea el problema de servir a sus clientes actuales y potenciales. El TKK, que transporta casi exclusivamente pasajeros en la comarca populosa de Tokyo-Yokohama, explota vías férreas, líneas de tranvía y una red de servicios de autobus. Cuenta con una clientela continua y creciente, invirtiendo mucho en la construcción de viviendas y otras empresas comerciales y desarrolla un programa extenso de modernización del equipo e instalaciones fijas.

via Denenchofu (13.1 km); Oimachi–Mizonokuchi (12.4 km); and Gotanda–Kamata (10.9). Suburban tram lines include the Shibuya–Futako–Tamagawa En (9.1 km) and Sangenjaya–Shimotakaido (5.1 km) lines, and the 2.2-km Kinuta shuttle line. Extensive road transport lines supplement the railway and tram system.

Several future railway extensions are planned, including an isolated 45.85-km line running from a Japanese National Railways connection at Ito to the popular tourist area of Shimoda on a peninsula south of Yokohama. The new line is expected to be completed in October of this year. Also planned, but with no completion dates set, are a 19.2-km extension from Mizonokuchi to Chuo–Rinkan and a 9.08-km line replacing the present Shibuya–Futako–Tamagawa En tram line.

Modernization of rolling stock has an important place in TKK's expansion program. Under a five-year program (1957–1961), the company will add 120 new passenger cars, as well as rebuild 68 older units in the company shops at Motosumiyoshi. Most recent equipment is of stainless-steel construction using Budd Company licenses. It has been built (as have most TKK cars) by the closely-affiliated Tokyu Car Manufacturing Company. The company's present roster consists of 297 motor units and 130 trailers on the railway and tram systems, most of them of postwar construction.

In addition to modernizing its railway equipment, TKK has purchased new cars for its tram operations as well. Most important of the tram cars are the two-

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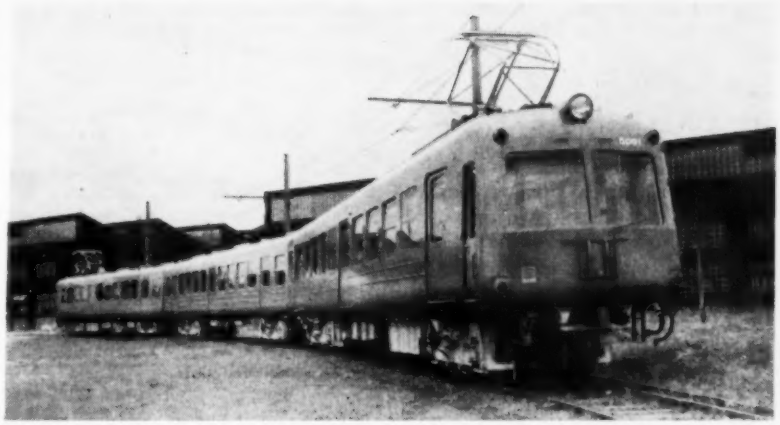
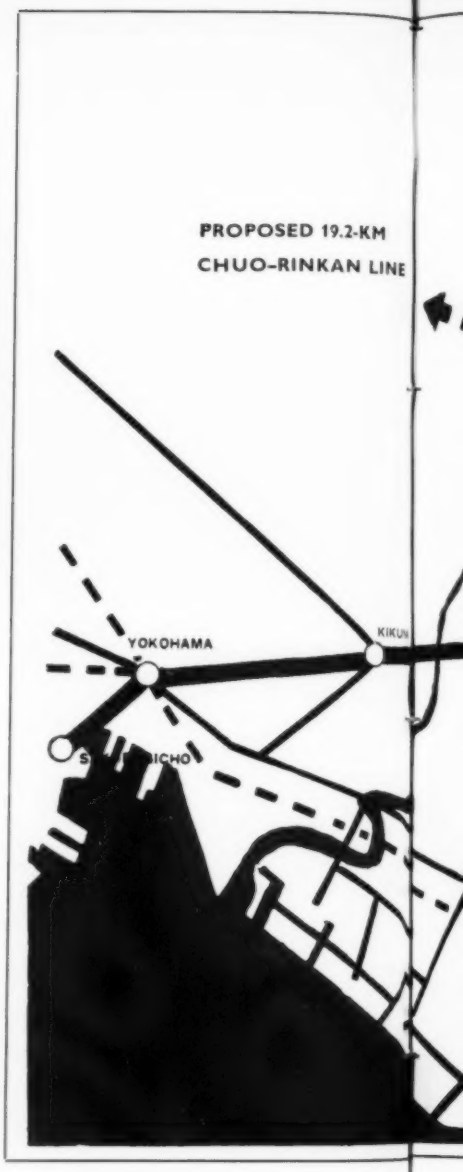


Tokyu-built streamliners share Toyoko-line duties with Budd-type stainless-steel cars (top).
Aérodynamiques par Tokyu avec voitures en acier inoxydable type Budd la ligne Toyoko.
Bei Tokyu gebaute Stromlinienzüge mit Budd-Wagen aus rostfreiem Stahl auf der Toyoko-Strecke.
Coches aerodinámicos y coches de acero inoxidable del tipo Budd en la línea Toyoko.

Five-axle "Talgo" articulated unit rolls downgrade into Fukato–Tamagawa En on main tram line.
Tram articulé "Talgo" dévale la pente jusqu'à Fukato–Tamagawa En sur la voie principale.
Fünfachsige "Talgo"-Gliedereinheiten walzen bergabwärts auf der Strassenbahnlinie.
Tranvía articulado de cinco ejes "Talgo" entra en Fukato–Tamagawa En en la principal línea.

Tram line handles heavy traffic, will be replaced by 9.6-km heavy-duty railway line.
Voie de tramway à trafic intensif sera remplacée par voie de chemin de fer sur 9.6 km.
Hauptverkehrsstrassenbahnen werden durch 9.6 km hochleistungsfähige Eisenbahn ersetzt.
Linea de tranvia sirve tráfico intenso, será reemplazada por una linea ferroviaria.



TOKYO ELECTRIC EXPRESS CONTINUED

unit five-axle articulated cars numbered in the 200 series. These cars carry a total of 200 passengers in their 21-meter length —60 seated and 140 standing. Built by Tokyu, these cars have an overall width of 2.3 meters, a height of 3.1 meters, and a 22-ton tare weight. A type AB electro-pneumatic camshaft control is used, and cars have SME-D electro-pneumatic straight air brakes.

Side by side with its equipment modernization program, TKK has been carrying out an extensive overhaul of physical plant that embraces the rebuilding of 16 stations, extension of platforms to accommodate longer trains (up to six cars) on the Toyoko line, and modernization or relocation of signals to permit higher speeds and closer headway, particularly in the area of the busy Shibuya terminal.

These projects are being carried out under difficult conditions, brought about largely by the already-intensive traffic (1500 million passengers were carried in 1959) and high real estate prices. To overcome these problems, TKK's engineers have made extensive use of temporary facilities to allow continued service at normal levels and have designed rebuilt structures to require a bare minimum of additional property.

TKK is largely the creation of one man, the founder Kayta Gotoh, and of his son, Noboru Gotoh, who is now president. Through its subsidiaries, and through the personal holdings of the Gotohs, TKK has assured itself of continuing and growing patronage by investments in real estate and other business ventures. On the one hand, it has built housing developments and promoted residential construction in the suburbs which it serves; to complete the picture, a large department store was completed in 1957 at the Shibuya terminal. The company also controls a gravel sales firm, amusement parks, dining halls and retail food outlets; subsidiary companies have been set up under a multilateral system of management.

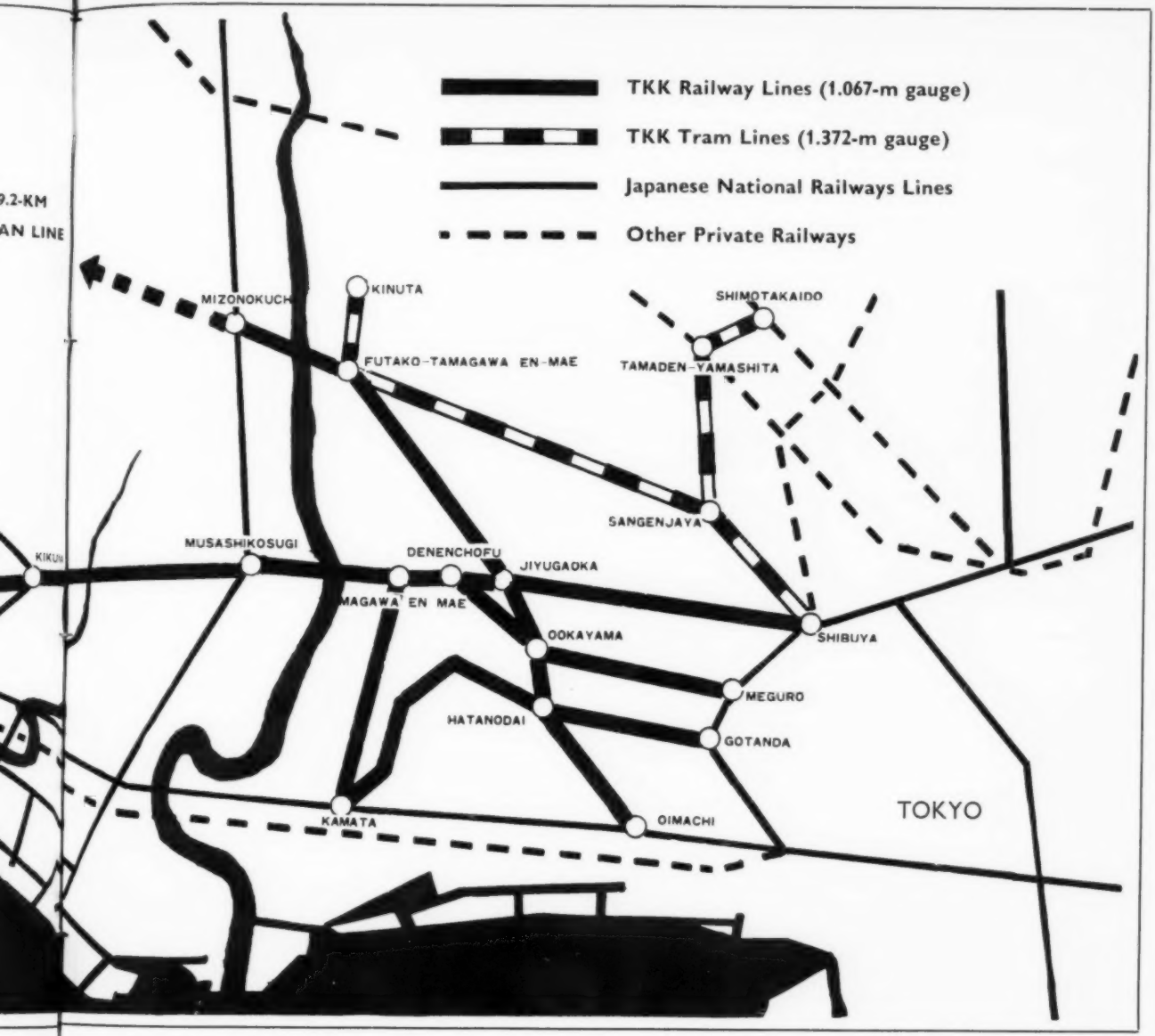
While passenger service is TKK's reason for existing, the 1.067-meter lines do provide limited freight service. Carload freight traffic in 1959 amounted to 9254 ton-km, and shows signs of a slight increase. For its freight service the line owns one 400-hp electric locomotive, 37 two-axle open cars, two two-axle closed cars, and a six-axle heavy-duty car. Less-than-carload and package service is provided by a converted former passenger car which operates in daily service, and overloads of package traffic are handled by additional units temporarily released from passenger service.

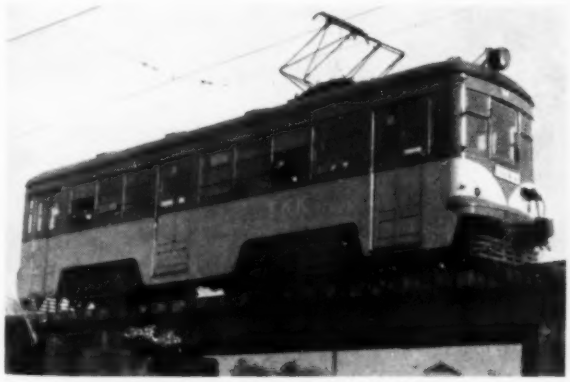
Principal types of rail in use are 50 kg/m (86.405 km) and 37 kg/m (66.971 km); a small amount of 45-kg/m rail and 19.975 km of 30-kg/m rail are also in use. Wooden sleepers are in general use, but 4220 concrete sleepers have been installed. Maximum curvature is of 40-meter radius, and the maximum ruling gradient is 4.55 per cent.

Automatic block signaling is in use on 62.7 km of line, including the Toyoko line. Time-interval signaling covers 14.2 km and a short section (2.2 km) uses the tablet block system. The trend is toward automatic signaling throughout.

The entire TKK transport system employs 7215 workers.

Operating revenues in 1959 were 4,791,608,766 yen ($13,310,000), expenses 4,319,350,283 yen ($12 million), leaving an operating income of 472,258,482 yen ($1,310,000).





Older tram car serves short single-track Kinuta shuttle line.
Tram ancien pour circulation navette sur voie unique Kinuta.
Ältere Triebwagen für den eingleisigen Kinuta-Pendelverkehr.
Coche de tranvia más antiguo sirve la linea en lanzadera Kinuta.

Carload freight traffic is handled by line's only locomotive.
L'unique locomotive se charge du trafic de charge complète.
Die einzige Lokomotive übernimmt den Wagenladungs-Güterverkehr.
La única locomotora de la linea sirve el tráfico de mercancías.

Products of Interest

New System for Modern Train Lighting

Pintsch Bamag fournit la réponse à l'éclairage moderne des trains.
Pintsch Bamag Produkt deckt neue Zugbeleuchtungsforderungen.
Pintsch Bamag: desarrollo de nuevos métodos de alumbrado de trenes.

A new train lighting system is said to satisfy passenger demands for improved illumination, and at the same time meet weight restrictions imposed by the trend toward lightweight car construction. The system employs a three-phase revolving-field DC generator mechanically driven by a lightweight shaft or coaxially flanged to axle-box by a spur-wheel gear; a silicon rectifier, and transistorized regulator. *Pintsch Bamag AG, Butzbach, Western Germany.* **IRJ 1**

New Machine Loads, Unloads Freight Cars

Le Lull "Dyna-Lugger" pour charger et décharger les wagons.
Lull "Dyna-Lugger" für das Laden und Entladen von Wagen.
Lull "Dyna-Lugger" para el cargo y el descargo de vagones.

The Lull "Dyna-Lugger" is a new multi-purpose loader-carrier which is specially designed for heavy-duty material handling, including the loading and unloading of railroad cars. Its payload capacity is 6800 kg with lift arms retracted; 4500 kg with arms extended. Four-wheel drive and four-wheel steering make the machine both versatile and maneuverable, its manufacturer says. *Lull Engineering Co., 3045 Highway 13, St. Paul 11, Minnesota, USA.* **IRJ 2**

Ditching Machine Converts to Crane

Excavateur Cullen-Friestedt se transforme en grue locomotive.
Cullen-Friestedts Grabmaschine auch als Lokomotiven-Kran.
Excavador Cullen-Friestedt, se usa también como grúa de locomotoras.

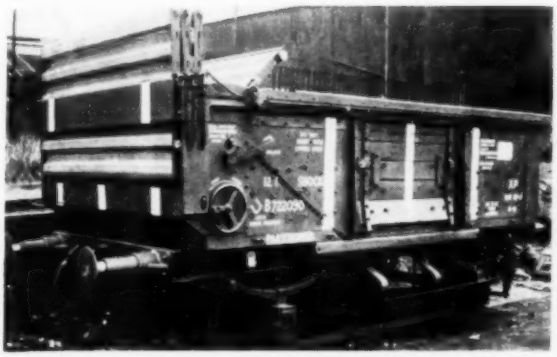
The ditcher was developed by adding a 0.57-m³ bucket (digging radius over 10 meters) and dipper stick to the car body and deck machinery of the manufacturer's Model 40 Burro locomotive crane. Averaging 29 km/h on a 113-km test run, the ditcher moved two air-dump cars, a caboose and a flat car. It also furnishes air for dump cars and can be converted to a locomotive crane by adding a standard boom. *Cullen-Friestedt Company, Chicago, Illinois, USA.* **IRJ 3**

Reversible Plow for Ballast Regulator

Nouvelle charrue, meilleurs flexibilité du régulateur de ballast.
Neuer Pflug gibt Kershaws Schotterverteiler mehr Flexibilität.
Nuevo arado Kershaw da más flexibilidad al regulador de balasto.

The 4 FW-A Ballast Regulator is now available with a new heavy-duty, reversible T-type plow designed to move ballast in or out or across the track in either direction. The machine is equipped with automotive-type drive and braking components as in previous models, as well as heavy-duty, reversible ballast regulating and scarifying wings. Hydraulic vertical control of wings is available optionally. *Kershaw Mfg. Co., Montgomery, Alabama, USA.* **IRJ 4**

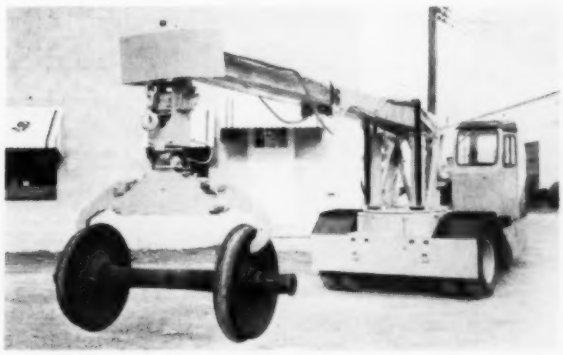
From Railway Suppliers



Sliding Roof Weatherproofs Open Cars

A l'épreuve des intempéries, grâce aux toit-ouvrant MacGregor.
MacGregor: wetterfeste Aufsatzdächer für offene Güterwagen.
Techos MacGregor protegen el cargo de vagones descubiertos.

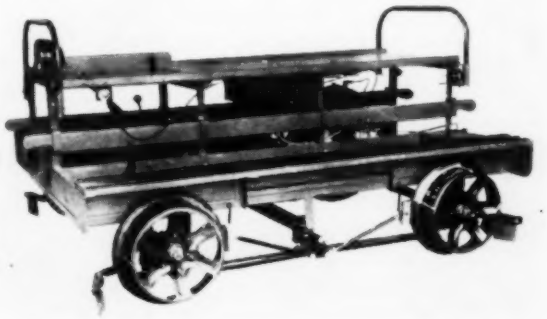
The MacGregor "opening roof" makes open freight cars suitable for carriage of sheet steel, paper and other commodities where ease of loading into a dry and completely weatherproof vehicle is important. The roof can be opened or closed by one man in less than one minute; is watertight and pilferproof, and can be sealed for customs clearance. It still permits loading or unloading the car in a single lift. *MacGregor & Co., Ltd., 5 Camomile St., London, E.C. 3, England.* **IRJ 5**



Hydraulic Crane Handles Railway Wheels

Des roues pour chemin de fer parmi la gamme produite par Grove.
Grove Kranwagen hantieren unter anderem Eisenbahnräder.
Ruedas uno de los productos maniobrados por la grúa Grove.

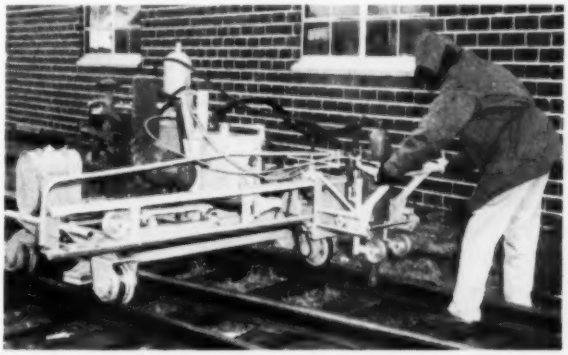
The Grove hydraulic crane is designed, built and tested for maximum performance in handling railway wheels and other heavy loads at low initial, operating and maintenance cost. It has a road speed of 32 km/h, maximum; hydraulic brakes, and four-speed full-reversing transmission. Boom length and swing can be varied, up to maximum limits, to meet the purchaser's requirements. *Engineering Equipment Company, 205 West Wacker Drive, Chicago, Illinois, USA.* **IRJ 6**



Wickham Trolleys Now Made in Australia

Les draisines Wickham 4/S fabriquées maintenant en Australie.
Wickham 4/S baut jetzt Rotten-Draisinen in Australien.
Carrillo de vía Wickham 4/S fabricado actualmente en Australia.

The Wickham No. 4/S rail-motor gang trolley is now being produced in Australia, under an arrangement by which about half its component parts are exported from England, and half manufactured locally. Similar arrangements are expected in future for other Wickham railway inspection and maintenance vehicles. *D. Wickham & Co., Ltd., Ware, Hertfordshire, England,* and *Marine & Industrial Power Co. Pty. Ltd., Sydney, New South Wales, Australia.* **IRJ 7**



Spike Driver for Both Tie and Rail Gangs

Enfonceur de crampon hydraulique opère sur deux voies.
Fairmont hydraulischer Klammernsetzer für zwei Schienen.
Martillo hidráulico de clavos Fiarmont opera en ambos rieles.

The Fairmont W100 Series A hydraulic spike driver is equipped with a driving assembly that rolls from one side to the other on a transverse track built into the machine so that spikes can be driven for both rails. This feature, the manufacturer reports, makes it possible to adapt the unit for use with both tie and rail gangs. Setoff rails are available as optional equipment. *Fairmont Railway Motors, Inc., Fairmont, Minnesota, USA.* **IRJ 8**

SOUTH AFRICA: The present extensive electrification program of the South African Railways is nearing completion, with three-quarters of the allotted £20,000,000 already spent. In line with a policy of electrifying wherever traffic is heavy, especially where there are steep grades, electrification was more than doubled—from 2080 to 4330 track km—between 1950 and 1960. The largest single project was the electrification, at a cost of £3,000,000, of 286 km between Touws River and Beaufort West on the Cape Town-Johannesburg main line. Completion of that section, this year, will permit electric operation for about 540 km out of Cape Town through the arid Karoo country, where shortage of water now requires use of Class 25 condensing steam locomotives.

The electrification program has included substantial purchases of electric locomotives. In 1952 the English Electric Company received an order for 60 Class 5E, 2000-hp Bo-Bo units. The same company has since delivered another 90 which are used with the first group in Natal. Associated Electrical Industries is now delivering 135 Class 5E1 units of 2200 hp. Further orders are expected, with last year's expenditure estimates providing £7,000,000 for 110 Class 5E units.

EAST AFRICA: With most railways in the southern part of Africa built to the 1.067-meter gauge, there has been periodic speculation over possible conversion of the one remaining large meter-gauge system—the 5,435 route-kilometers operated by the East African Railways in Kenya, Uganda and Tanganyika. Details of the conversion problem are now being investigated by C. T. Henfrey, who retired last year as EAR's chief engineer. Although EAR rolling stock has, for several years, been designed for possible gauge conversion, the track widening would still be a big and expensive project. Differences in brake and coupler types would also present a problem.

FRANCE: The SNCF has agreed to build a spur line to Le Touquet airport, so passenger and car-sleeper services can handle cross-Channel passenger and car ferry traffic of Silver City Airways. The spur, due for completion in 1962, will permit fast, integrated air-rail service to a number of European cities. French railways already cooperate with SCA in operation of the London-Paris "Silver Arrow" passenger service. The Compagnie Air Transport—of which SNCF is the principal shareholder — will also run vehicle air-ferry services across the Channel in cooperation with Silver City.

EAST GERMANY: The local rolling stock industry, working mainly for export to other Communist countries, is said to have only part of its capacity available for East Germany's own needs. The urgent task of modernizing the passenger-car fleet has, as a result, been partly taken over by the railways themselves, which are rebuilding old three- and four-axle coaches into paired three-axle units which can be operated as a single car.

. . . Waggonban Görlitz is reported to be developing a four-unit train with two 1800-hp diesel motors and a maximum speed of 160 km/h.

. . . In December, the German State Railways received their last steam locomotive, built at the Karl Marx Works at Potsdam-Babelsberg. In future, only diesel and electric locomotives will be built. The first of a new series of Bo-Bo diesel-hydraulic locomotives (Class V180) was completed last year, and two prototype electric locomotives (Class E11) were finished at the end of January.

WEST GERMANY: One track between Hamburg and Lübeck is being relaid to a gauge of 1432 mm instead of the usual 1435 mm. German railway technicians believe the 3-mm difference will result in smoother running and less wear on wheels and rail.

. . . With introduction of 1962 summer schedules, new equipment will be added to the "Rhinegold" express. Biggest innovation will be inclusion of dome cars, with space below the domes utilized for baggage storage. Most passenger accommodations will be in center-aisle, instead of compartment, cars. Other details of the new equipment are under discussion by the German, Netherlands and Swiss railways.

POLAND: A five-year (1961–65) plan for Polish railways reportedly includes the following items:

Electrification of 200 km per year, to bring total electrified mileage, by 1965, to about one-tenth of the national system, handling about one-fifth of the traffic.

Acquisition of 280 three-car electric multiple-unit trains to be built in Poland; and 254 electric locomotives. Twenty Bo-Bo units will be imported from England and 30 from Czechoslovakia. The others—120 Bo-Bo mixed-service units and 102 Co-Co freight locomotives—will be built in Poland.

Purchase, probably from Hungarian or Polish builders, of several hundred diesel locomotives ranging from 150 to 1600 hp for secondary line and yard work.

Construction or purchase of an estimated 1300 new passenger cars and 30,000 modern freight cars. Some of the new coaches will be designed for international services at speeds of up to 140 km/h; some of the freight cars will have capacities of up to 60 tons.

Modernization of track, including installation of heavier, and welded, rail, better ballast and hardwood or concrete sleepers.

Installation of 3500 km of modern signaling.

Mechanization of a number of classification yards.

Atelier Diesel Anglais

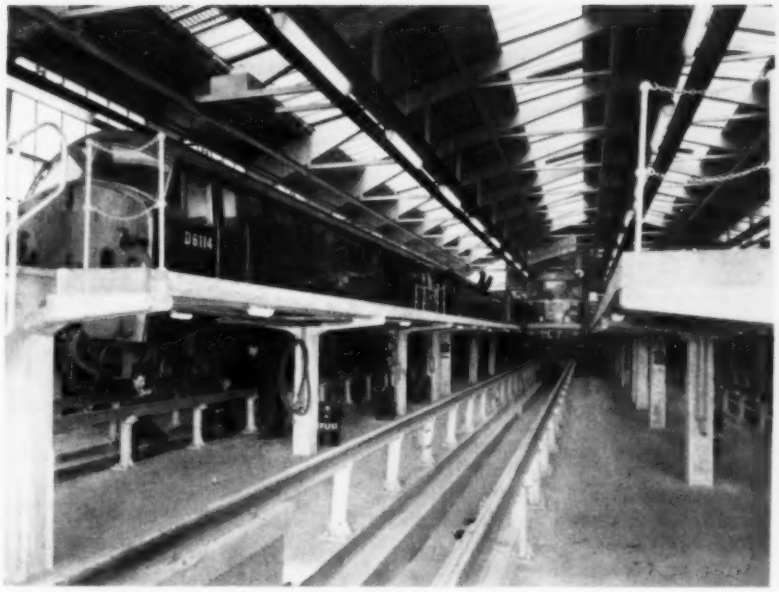
Nouvel atelier d'entretien diesel britannique à deux niveaux et à double entrée, spécialement conçu pour réduire tout mouvement non-essentiel et éliminer perte de temps.

Britische Diesel-Werkstätte

Die "Britisch" hat eine neue doppelseitige Diesel-Wartungswerkstatt mit verschiedener Bodenhöhe entworfen, um unnötiges Rangieren und Nebenzeit der Arbeiter zu vermeiden.

Taller Diesel Británico

Nuevo taller de mantenimiento, a dos niveles, de construcción simétrica, planificado para reducir movimiento inútil y eliminar pérdida de tiempo.



Stratford diesel maintenance depot includes two-level working stages.
Atelier d'entretien diesel à Stratford, à plate-formes à deux niveaux.
Doppelte Arbeitsbühnen in der Diesel-Wartungswerkstatt in Stratford.
Taller diesel en Stratford permite el trabajo a dos niveles.

Britain: Double Diesel Depot

A split-level double-ended diesel maintenance depot at Stratford, London, on British Railways has the workshop, office and staff block across the center. Reason for this layout is that locomotives are only a minute's walk away and non-productive movement of staff is substantially reduced. Another feature of the depot is the liberal provision of supplies and services, including piped services to facilitate maintenance.

To cater to its growing fleet of diesel locomotives the Eastern Region of British Railways has brought into use a double-ended diesel locomotive maintenance depot at Stratford, London. The depot is 91.4 meters long and has eight short stub-end tracks on either side of the central two-story office, workshop, stores and staff block. The tracks accommodate 16 main-line diesel units, on which work can be carried out at two levels: from raised platforms or a depressed floor.

Construction of the depot consists of a precast reinforced concrete frame with a roof of double skin asbestos cement sheeting with fiberglass insulation. Tracks are carried on tubular steel supports 1.5 meters high and at 1.5-meter centers. Working platforms are 1.37 meters above rail level and the lower floor is 76 cm below rail level. Power-operated folding and sliding doors are provided at each end of the depot. The office and workshop block is framed in reinforced concrete. Infill panels are of brick and glass.

Because of the short stub-end tracks, once a locomotive is in the depot there is usually no need to move it until work is completed. Close proximity to workshops, stores, etc., cuts down movement of personnel. Maintenance operations and running repair work include work

CONTINUED

Work benches are located close to the locomotives being repaired.
Les établis se trouvent tout près des locomotives à réparer.
Bei der Reparatur stehen die Arbeitsbänke dicht neben den Lokomotiven.
Bancos de trabajo están cerca de las locomotoras que están reparándose.

DIESEL DEPOT

CONTINUED FROM PAGE 53

short of the removal of an engine or generator.

In the central workshop there is a one-ton capacity transporter crane and filter cleaning, injector testing and lubricating oil testing equipment. Other equipment includes rough cleaning tanks, de-greasing plant, paraffin washing tanks, a small pedestal drill and a tool grinder. There are also outlets for power tools and hand lamps, and compressed air outlets.

Portable equipment in the depot includes battery chargers; lubricating stillage (with tanks for two oils and two greases) equipped with compressed air operated pumps and self-winding hose reels; radiator water stillage; small transformers to enable internal electric lights on the locomotives to be used without draining the battery; and floor cleaning machines which both scrub and dry the floors.

Apart from the workshops, the center block incorporates stores, locker rooms, mess rooms, lavatories and wash rooms. The depot is heated by high temperature high-pressure hot water—"Brightrad" panels being provided both above and beneath the platforms. The adjacent boiler house is equipped with two boilers of the wet-back, double-pass type with low water content and fully flooded.

There is a considerable amount of natural light in the depot as continuous runs of glazing go down to within about 1.82 meters of ground level at the sides of the building. Artificial lighting is by cold cathode fluorescent fittings in the shed and hot cathode fluorescent fittings in the center block. In the pits, oil-tight tungsten filament lighting is provided.

Special free-opening ventilators are fitted for use when engines have to be run inside the depot. When this is done, locomotives are positioned with exhausts below the ventilators.

Electric power services in the shed provide the following facilities for each locomotive berth: 30-amp proved power point, suitable for battery charging purposes; two 15-amp earth proved points for electric tools; one 3-phase 15-amp earth proved point for special tools; and two 50-volt socket outlets for portable hand lamps. Two 50-amp earth proved socket outlets are provided at each end of the depot so that portable welding equipment can be used if necessary.

A locomotive fuelling installation is provided on the outlet tracks from the depot. This consists of three 227-liter-per-minute diesel oil dispensers with presetting meters and ticket printers.

Piped services for connecting direct to the locomotives in the shed are two types of lubricating oil, a waste oil pipeline, compressed air, radiator cooling water and both hard and soft water pipelines. Supplementary storage tanks are provided in the basement so that lubricating oil can be dispensed to the locomotive berths. They are arranged so they can be connected in multiple to the dispensing pumps. At each berth a pre-setting meter is provided with a large dial calibrated in gallons up to 200 gallons (908 liters) maximum. The operator pre-sets the oil requirements according to the class of locomotive.

Contaminated oil from the diesel engine sump is disposed of via a waste oil pipeline. A compressed air operated pump is used and the waste oil is used as boiler fuel.

PERISHABLES

CONTINUED FROM PAGE 19

planted at the Cape of Good Hope over 300 years ago to help provision ships of the Dutch East India Company plying between Holland and the Far East. The first ship supplied from this orchard started an export trade which has since grown to nearly 400,000 tons a year.

The factors which have made possible the successful and profitable export include provision by the South African Railways & Harbours of refrigerator cars and 6000 ventilated fruit trucks; fast movement by rail and by road; and pre-cooling stores at the principal export ports.

The relationship between expansion of port pre-cooling services and the growth of the fruit export trade is best illustrated by the developments which have taken place at Cape Town, from which most of the fruit is shipped.

The first cool chambers there were opened in 1915. From 1919 to 1925 the annual export of fruit climbed from 3783 tons to 45,380 tons. As a result, the railways, in 1925, opened a new and much bigger system of cool chambers, and in the next 10 years exports rose to 205,396 tons a year. Another new store was completed in 1936, and fruit exports have continued to grow to their present levels of around 400,000 tons annually.

As of today, Cape Town's pre-cooling stores, which cost around £2,000,000 to build, are said to be the largest in the world. Fruit is handled in them by the most modern methods. Seven ships can be loaded simultaneously.

The principal pre-cooling store at Table Bay is capable of storing 7700 tons of fruit, with a through-put of 13,000 tons a week. With several smaller buildings, and a new one now under construction, Cape Town will soon have space available for 17,160 shipping tons. At Port Elizabeth, pre-cooling stores can accommodate 6300 tons, while a pre-cooling plant to be erected at Durban will provide additional space.

LETTERS TO IRJ

Utrecht, Netherlands

To the Editor:

It seems only fair to diesel motive power to point out that Mr. H. F. Brown, in his recently published paper on economic results of diesel-electric power in the United States (IRJ, Feb., p. 62), is overlooking some facts.

He arrives at the conclusion that, to replace the 18,959 diesel units now in use, 7870 modern steam units would be sufficient. On this figure (plus the extra steam units required by lesser availability of steam equipment) he bases his whole argument as to the economic superiority of modern steam power.

The calculation seems to be made as follows: the average US train being hauled by 2.41 coupled diesel units, the simple division of 18,959 by 2.41 gives the number of 7870 steam locomotives needed to replace all diesel power. This logic, however, overlooks the fact that a harmonious adjustment of available horsepower to train tonnages to be hauled is possible to a high degree with a fleet of diesel units of the relatively small average capacity of 1500 hp. In the case of steam equipment, to which Mr. Brown allocates an average capacity of 3615 hp, it will be impossible, in everyday train operation, to avoid over-capacity in the hauling power of a certain number of trains.

This means that Mr. Brown has calculated the number of steam locomotives required to replace the diesel fleet too low. An increase in steam equipment of only 10 per cent would convert modern steam power's advantage into a disadvantage.

G. Hupkes
T. Tieleman
Netherlands Railways

CAPITAL EXPENDITURES

Austrian Federal Railways—Latest report in International Railway Journal's continuing survey (started in October 1960) of railway capital expenditure programs comes from the Austrian Federal Railways. The ÖBB plans to spend some 497,000,000 schillings (a little more than $19,000,000 US or £6,800,000 sterling), as follows:

Item	Schillings (millions)
Motive power	31.2
Freight cars (200)	7.7
New line construction	72.0
Major track improvements	2.5
Signaling	5.5
Yards and terminals	16.0
Shops and repair facilities	2.0
Other improvements	360.1
Total	497.0

Locomotives to be acquired include five 600-hp narrow-gauge diesel units, 14 400-hp diesel shunters, and 10 600-hp shunters. The allocation also includes 10 lightweight motor coaches.

New line construction allotments are for the building of the 17-km Jauntalbahn in Carinthia. Major track improvements are planned for a total of 9.1 track-km.

Yard and terminal expenditures will be for the rebuilding of Vienna South station and alterations to the Bruck/Mur station, with two million schillings for expansion of the Wörth workshops.

The program's largest item, 360.1 million for "other improvements," will be devoted to electrification, improvements in the telephone network, dieselization of secondary lines and construction of the Vienna Schnellbahn rapid transit.

The entire program represents a continuation of previously-planned expenditures, and is to be financed by Federal government allocation. Part of the required capital will be derived from government excess income, and part from the proceeds of government credit operations. The loans are to be raised by the government primarily in the internal market; amortization of the loans will be by the government, but ÖBB will be required to meet the interest payments.

The plan is part of a long-range program drawn up by the ÖBB which extends into 1968 and includes a proposed yearly expenditure of 1400 million schillings for electrification, track improvement, modernization of rolling stock, and improvements to main stations, buildings and other facilities. Actual year-by-year budgeting is planned to fit into the overall financial requirement for the program, subject to the extent allowed by the budget of the government.

World Market CONTINUED

a kitchen for meal preparation. All cars, including the trailer, have driver's cabs at both ends. When delivery is completed, the cars will provide an express commuter service between Sydney and Wollongong (83 km) on the NSWGR's Illawarra line, and a fast passenger schedule from Sydney to Nowra (152 km) between the morning and evening traffic peaks.

NSWGR have also ordered, from local manufacturers, 200 13.7-m louvered box cars; 50 bogie flat cars; 10 40,000-liter tank cars, and 610 freight-car bogies; and, from A. E. Goodwin, Ltd., 15 900-hp Co-Co branch-line Goodwin-Alco diesel-electric locomotives, based on the Alco DL531 design. A contract previously awarded to A. E. Goodwin, for 150 BSV-class bogie sheep cars has been increased to 550.

▶ *Norfolk & Western (USA)*—To accommodate 35,000- and 45,000-ton colliers being built in Italy and Japan, the N&W is building a new $19,000,000 coal pier at Lamberts Point, Norfolk, Virginia. The new pier, which is scheduled for completion in December 1962, will be approximately 400 meters long; will be able to load all types of colliers now operating or contemplated; and will have a maximum dumping rate of 8000 tons per hour. The first contract on the pier, awarded to the Wellman Engineering Company, Cleveland, Ohio, covers construction of a two-car rotary dumper, barney haul, belt conveyors and a traveling ship loader, at a cost of about $5,000,000.

▶ *Queensland Railways (Australia)*—Have awarded to Thiess Brothers Pty. Ltd., of Queensland, a contract amounting to £A1,159,000 for construction of a plate girder bridge across the Burdeking river at Macrossan (IRJ, Feb., p. 54). The bridge, being built as part of the Mt. Isa line rehabilitation project, will take nearly three years to complete. It will be more than 700 meters long, about 25 meters above the river bed, and five meters above maximum flood level.

Another contract, also awarded to Thiess Brothers, covers construction of about 19 km of new line in connection with the Mt. Isa project. The new line will reduce grades and widen curves to increase capacity of diesel-hauled freight trains bringing minerals from the Mt. Isa mines.

▶ *South African Railways & Harbours*—Have placed a £200,000 order for three additional Type 1200 electronic computers. SAR's first such machine was installed at Johannesburg last August to deal with pay vouchers. Two ICT 1202's will do similar work at Port Elizabeth and East London, while a fourth (delivered in January) will be used for analysis of freight traffic, ticket audits and employee pension records.

▶ *Victorian Railways (Australia)*—Are spending £26,000 on installation of radio telephone equipment to speed up freight service in the Melbourne metropolitan area. Two systems will be used—a general signal for highway vehicles moving freight to rail stations, and a selective signal for emergency and maintenance vehicles.

▶ *Western Australian Government Railways*—Have ordered from Commonwealth Engineering Pty. Ltd., of Queensland, five 0-6-0 diesel-hydraulic shunting locomotives with 450-hp Cummins VT-12 turbocharged engines and twin-disc torque converters.

Unique trolleys are used in the new system adopted by the Swedish State Railways for replacing wooden sleepers with concrete.
Chariots-porteur pour remplacer traverses en bois par celles en béton dans le nouveau système des Chemins de Fer Suédois.
Neuartige Tragkarren werden bei der Schwedischen Staatsbahn beim Auswechseln der Holz- gegen Betonschwellen verwendet.
Carrillos especiales se emplean por los FC del Estado suecos para reemplazar las traviesas de madera por las de hormigón.

Sweden: Concrete Sleepers for Higher Speeds

Since 1957, the Swedish State Railways (Statens Järnvägar) have been replacing traditional wooden sleepers with more permanent concrete crossties on 128 km of main line between Stockholm and Gothenburg and Katrineholm and Malmö. Between 1960 and 1963 the same lines will be provided with additional sleepers which will make it technically possible to increase train speeds from the present 115–125 km/h—already among Europe's fastest—to 162 km/h on some sections.

In addition to permitting higher speeds, the new sleepers give a smoother ride, and are virtually maintenance-free.

The concrete sleepers and rails are made up together in 36.6-meter panels; moved into position on special trolleys, and then welded into the longest possible sections.

Under the general plan of modernizing its track to permit higher speeds, the SJ has ordered 80,000 concrete crossties to be delivered annually until 1965; is relaying rail on the same track sections; and, where possible, is increasing radius of curves. The present minimum radius, of at least 1000 meters (3280 ft), permits speeds of up to 130 km/h with rolling stock now available.

[The foregoing information was supplied by Holger Lundberg, American-Swedish News Exchange, New York City.]

25-KV TRACTION

CONTINUED FROM PAGE 18

during idle periods so maintenance does not require taking cars out of service.

Arrangements must also be made to have steam-locomotive engineers released in groups for training on the electric locomotives.

Depots for maintenance of overhead equipment should be spaced at about 60–70 km on main lines and 40–50 km on suburban sections to permit crews to reach any point quickly in case of accident or emergency. Depots for maintenance of switchgear at supply control points should preferably be located with one of the overhead equipment depots; one depot can usually look after 50 to 60 interruptors not more than 100 km distant.

Since all overhead telephone and telegraph wires must be replaced with cables during introduction of AC traction, it will no longer be possible to connect portable telephone instruments to them temporarily in cases of emergency. Thus, it is advisable to install portable telephone sockets at intervals of about 1 km along the track. Further, type of cables to be provided for overhead wires has to be determined with due consideration for possible future telecommunication facilities.

As a final word of caution, the field survey, while it must be carried out in advance of electrification, should not be undertaken too far ahead. Electric traction is installed only where traffic density is growing, and a corollary of that growth is the need to modify track and yard layouts. It is obvious that any yard-remodeling work carried out after the survey has been completed will make the final survey plans obsolete.

Another important point to remember is that the main function of track survey plans is to permit preparation of an economical design of the layout of overhead traction equipment. If this layout is designed expeditiously after completion of the track survey, if the location of overhead equipment structures is finalized and decided after checking at the site, and if these layout plans are widely circulated among railway officers, it will be possible to arrange for any track remodeling plans and works to be so dovetailed as not to require any modification of the proposed layout of traction structures.

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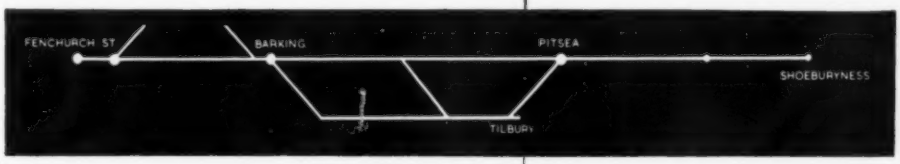

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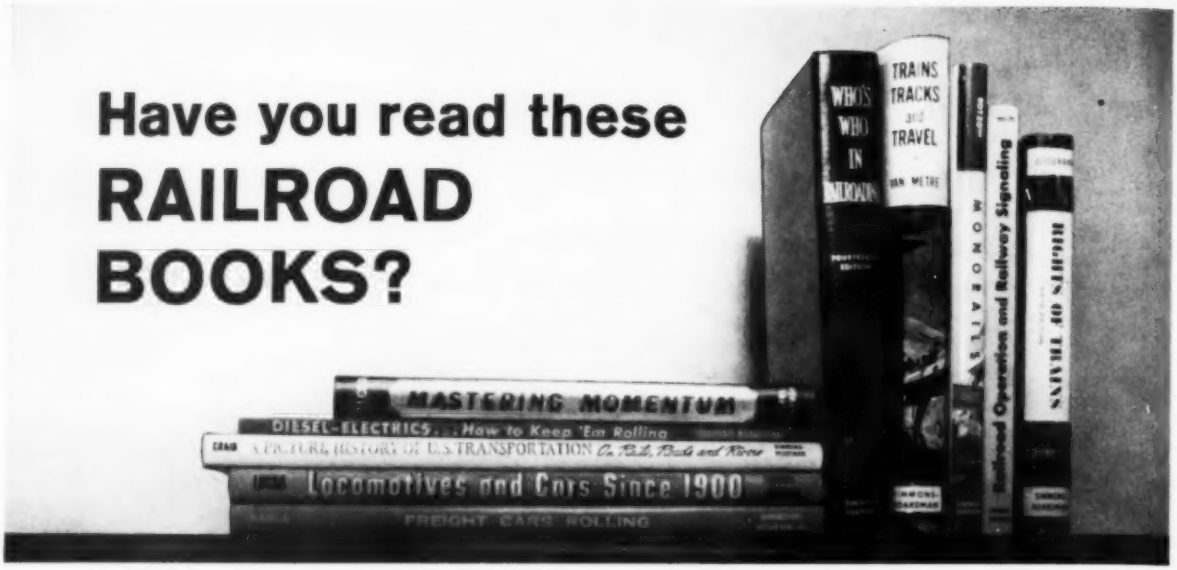
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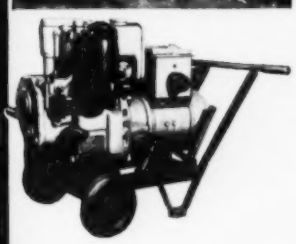

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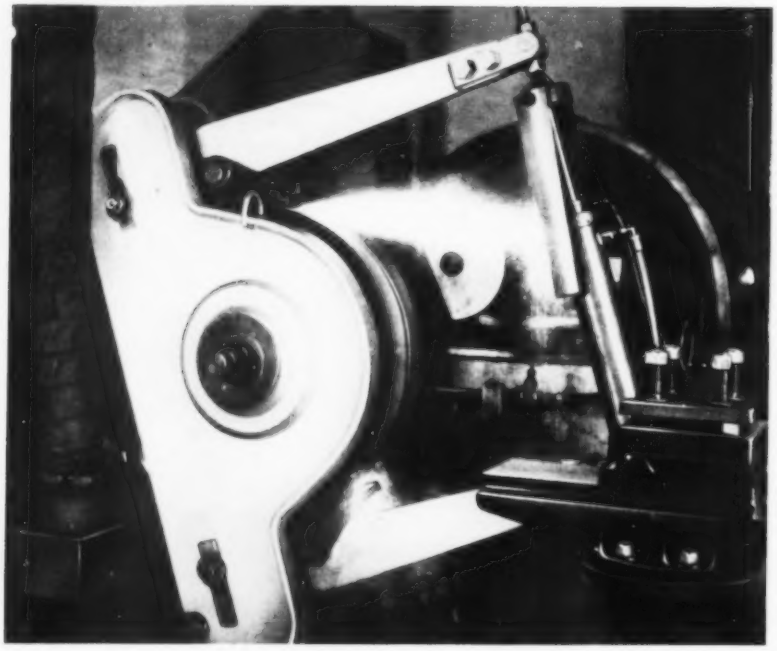

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Communist China 'Walks on Two Legs'

"Walking on Two Legs" is Communist China's picturesque way of describing its concentrated drive to expand its network of so-called "local railways."

According to the Chinese press, the drive developed as a result of the country's dire need to overcome severe transportation bottlenecks which have plagued China as its economic development has been intensified. The principal aim of the program is to fill the gap between mines and smelters, factories and docks, agricultural communes and local markets, etc., through construction of narrow-gauge lines which are not necessarily linked with the main railway network.

The local lines must, however, be built without diverting raw materials or labor from the national plan. Thus, they are being constructed from locally manufactured materials—often of the most primitive nature—by local labor. The state railways enter the picture only when engineering or technical problems present otherwise insurmountable difficulties.

It has been reported, for example, that some lines have been built with "rails chiseled from stone or made of wood or pottery."

Cast iron rails manufactured in local blast furnaces are said to be fairly common.

Locomotives adapted from gasoline or diesel truck and automobile engines, and some small steam locomotives, are reportedly used, with construction costs assumed by the factory, commune or other enterprise which needs them and supplies the necessary labor. "Victory" trucks have reportedly been converted into locomotives capable of hauling 12 tons; or, when fitted with small steam engines, as much as 122 tons.

While scattered references in the Chinese press make it impossible properly to evaluate the entire program, reports which do appear give some indication of the primitive nature of the great proportion of the country's internal transportation network, and the great stress which the state is apparently placing on the local railway program to remedy the situation.

The first local railroad was opened, according to the best available information, in 1958. It was only 1.7 km in length. By the end of 1959, however, some 2400 km of short-distance trackage had been constructed, and the state plan for 1960 reportedly called for about 10,000 km to be in operation by the end of that year.

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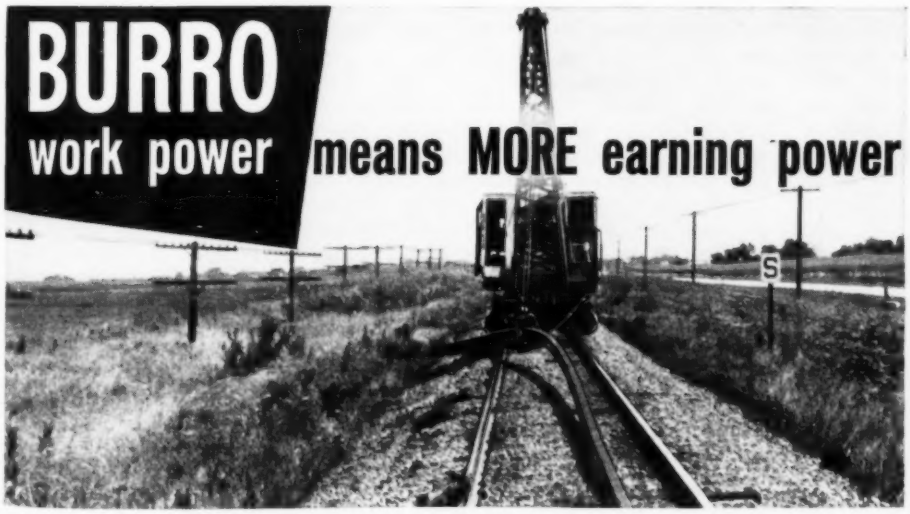

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After Hours with Jim Lyne

BUSINESS IS GOOD IN MEXICO—I read recently the report of a press conference by Don Benjamín Méndez, director general of the National Railways of Mexico, in which he told of the railways' growing traffic and continuing program of improvements (new diesel-electric locomotives, heavier rail, modern communications and workshops). However, he predicted receipts of 1,400 million pesos and expenses of 1,800 million pesos in the current year (i.e., a deficit which is greater than the standard subsidy of 215 million pesos).

The increased expense is due in large measure to more liberal working arrangements for the staff. The railways are not operated primarily as a commercial enterprise, but with the objective of providing low-priced transportation for the public, combined with improving conditions for the working forces.

PUBLIC SERVICE OR PROFIT?—The public-service (rather than profit) objectives of the Mexican railways are, of course, more the rule than the exception with most railway systems in government ownership. However, this is not always so—because quite a number of national railway systems are expected to pay their way, with little or no help from the public treasury. And privately owned railways are by no means exempt from public policy which requires them to provide "social services" (e.g., the transportation of suburban passengers), beneficiaries of which may pay only part of the costs of the service the railways provide.

It certainly makes for better economics and sounder finance—whether railways are publicly or privately owned—that social services required of them be definitely labeled and paid for as such, not being made a burden on the railways' self-sustaining services.

HOLLAND LOOKS AT PIGGYBACK CONTINUED

approximately 700 Guilders ($194 US).

For new equipment the additional cost of the trailer is expected to be somewhat less—a factor which can be expected to have considerable appeal to the trucker.

Fundamental to the NS approach to piggyback is the principle that road and rail service can be complementary rather than competitive. Following this principle, the service if offered would be to the trucker himself, with the trucker responsible for the shipment from end to end and the railways providing simply the transportation of the trailer—a system similar to the so-called "Plan I" used in US piggyback operations.

Although NS owns a controlling interest in Van Gend & Loos—probably the largest single road freight hauler in The Netherlands—and works closely with it, the truck firm is, as one NS man commented, "a daughter that has grown up and will have her own way." In any eventual piggyback service, therefore, Van Gend & Loos would have no special position, but will be treated exactly like any other trucking firm.

Rates would be based on a comparison of road haulage costs and rail costs, and NS personnel conducting the present studies feel that a rate can be offered which will not only provide a profit for the railway but savings for the truckers as well. The rate structure would in all likelihood be based on present French rates, and would include incentives for consistent traffic that would provide for maximum utilization of rail equipment.

First service, if offered, would most probably be between Rotterdam and Paris, where a sizeable regular truck traffic already exists. The advocates of the service feel that if a regular traffic of only four to five cars daily each way can be developed the service would make considerable inroads on truck traffic. If successful, the service would most logically be extended next to Amsterdam.

Difficulties faced in any such service, if inaugurated, are pointed out by the fact that the Rotterdam-Paris service would exclude, at least initially, perishables—an important commodity in the Rotterdam-Paris truck traffic. Reason for the exclusion is the high passenger-traffic density of the European railway system; road-haul perishables presently leave Rotterdam at midday, in order to reach the markets of Les Halles about midnight. To match this timetable would require piggyback traffic to pass through Brussels or other centers at the peak of the evening suburban rush hour—and passenger traffic makes this virtually impossible as schedules now stand.

What is the potential for piggyback in Holland? Many in the Netherlands transport industry feel that adoption of piggyback—of whatever system—is essential; one spectator at the Utrecht demonstration observed "Either they adopt this system now, before the trucks have gained too much, or the railways might as well close up shop so far as freight traffic is concerned within twenty years."

Truly extensive use of piggyback faces many obstacles, and one of the most pressing is the lack of standardization or unified thinking about piggyback in the European railway industry. Perhaps the biggest potential source of international piggyback traffic for the Netherlands, as an example, is with Germany, but NS personnel remain unconvinced of the feasibility of the German "Huckepack" system, and the Germans seem unconvinced about the Kangourou.

Another problem to be faced is the passenger traffic density–presently almost all NS freight traffic is carried between midnight and dawn when passenger trains are not operating, a fact which limits the flexibility of freight timetables. There are those who feel that the ultimate —and inevitable—solution must be the operation of piggyback trains on fast schedules by day, running between the passenger schedules.

Whoever prevails—those who feel piggyback is inevitable and should be started immediately or those who are not so sure—the NS can be credited with taking the initiative, and with giving both the road haulers and the shippers an opportunity to see the equipment in action and add their voices to the ultimate decision.

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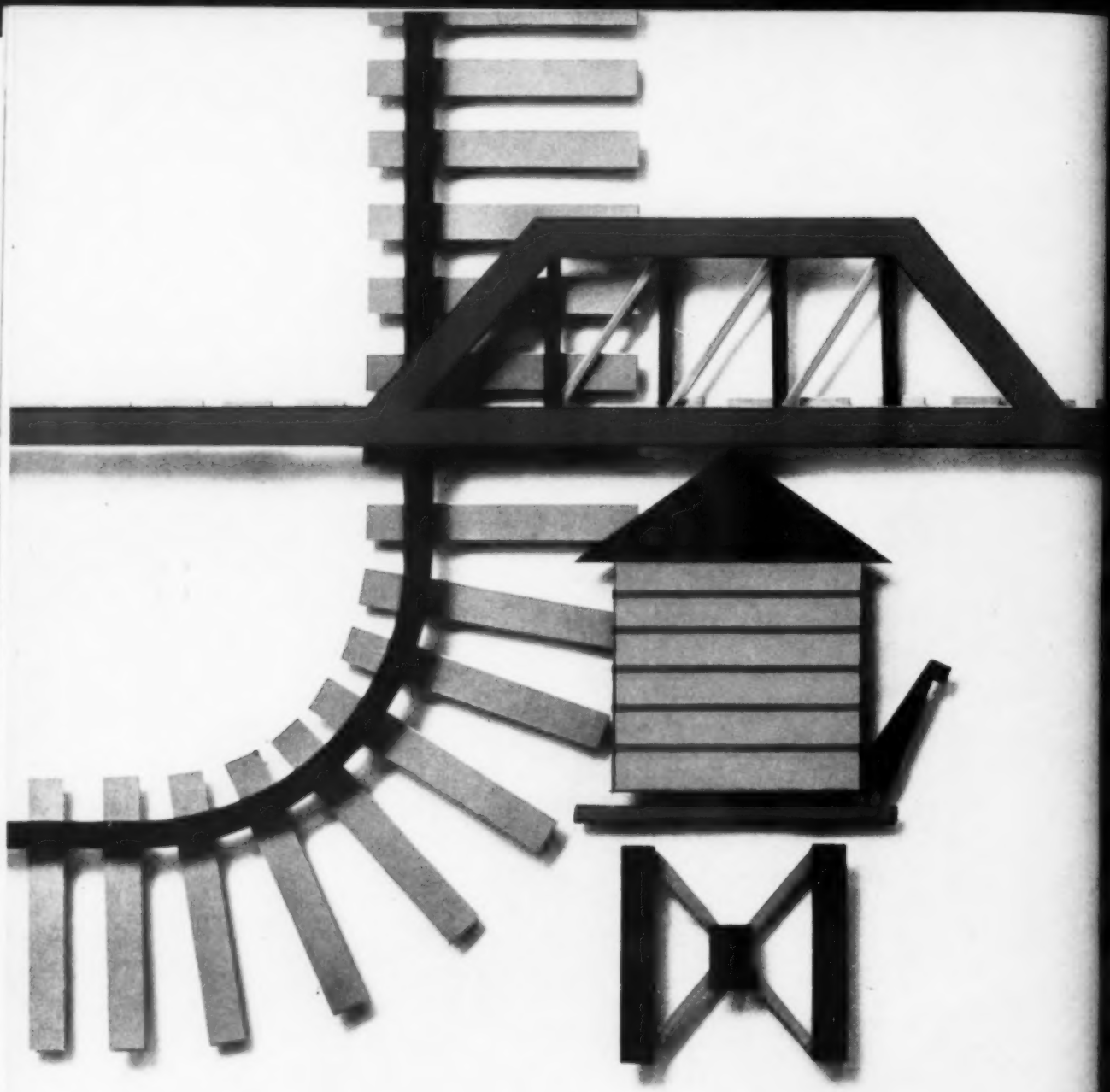

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